THE

VETERINARY JOURNAL

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Editorials.

THE CONSTRUCTION OF THE EXAMINING BODY AND THE EXAMINATIONS.

A GOOD deal of friendly criticism has been passed through the columns of the Journal during the past twelve months on the construction of the Examining Board, and as the present time is the one at which the Examiners are again chosen, possibly those who have the selection may have devoted a little time and attention to the subject.

The particular point at issue appears to be as to whether each subject shall or shall not have one internal and one external examiner, the former a present teacher in one of the schools, and the latter a stranger. In favour of the former it is claimed that the teacher will know with more certainty which of the students are hard-working and deserve to pass, whilst when both examiners are of external selection, and only see the student for a short time, there is always a certain element of chance that the spasmodic or lazy worker may fluke through, and his more deserving, plodding *confrère* be ploughed. This certainly does sometimes happen under the present conditions, but whether the other system would alter it is a matter of doubt. Certainly it would materially help a teacher to get steady work done throughout the term if only the student thought that the monthly examination work would be included in the addition for the pass. The arguments of the various writers appear, when summed up, to rather point to the fact that the present system of two stranger external examiners is a good one, but that it might be very well improved by a consideration, in the summing up, of the class examination marks which a student has earned during his college term. Add these to the marks he obtains at the professional examination and there is no doubt but that the result would be the fairest which is possible when the

requisite pass or honour percentage is considered; more than all, it would entirely do away with spasmodic cramming and strengthen the hands of the teacher (when he tries to induce steady work) more than anything else.

One word might here be said on behalf of the Examiners in connection with the present system of an ambulatory board. Now that there are colleges in London, Liverpool, Edinburgh, Glasgow, and Dublin, and all have students to examine, whilst all insist upon the examination of their own students at their own respective College, it becomes rather a trial for an examiner who earns his living in private practice to leave his practice for several days or even more than a week, two or three times a year; and it might be well worth while for the Council to consider whether one common centre, at which all the students could assemble, could not be arranged. It could be on neutral ground, say York or Birmingham, the former city being especially central for every college. Certainly the theoretical, indoor, portions of the examination tests could be carried out at York as well as any other city, and we also venture to suggest that there would be no insuperable difficulty in finding a suitable place at which to hold the practical tests. The students' names could be arranged alphabetically and their college would thus be indistinguishable and the examination standard quite uniform. The time of the examiners now lost in travelling (they often go hundreds of miles to examine five or six students) would be economised, and the expense of the Royal College of Veterinary Surgeons, even if they paid the travelling expenses of each student, would be considerably less than at the present time.

THE ENDOWMENT OF VETERINARY SCHOOLS.

No one who has ever studied the question will dispute the statement that a Veterinary School is, if worked on up-to-date and proper lines, a most expensive establishment, and it is now universally recognised that the privately equipped school has had its day. The British and American Colleges can hardly, up to the present, be said to have received the support either from the State or from other sources which they legitimately deserve. One would have thought that in countries like ours, in which animal life is so exceedingly valuable, there would have been no difficulty about raising money for such an object, for it would be a sorry day for the nation if the veterinary profession became extinct. Continental Governments have long recognised the utility, and indeed necessity, to the

State of well-educated veterinarians, and have provided splendidly equipped colleges, complete in every necessary branch of science. At last America has moved, and a pleasing item of news is a recent announcement that the University of Illinois has received a gift of $250,000 and a perpetual lease of grounds in Chicago for the foundation of an extensive and well equipped Veterinary College, and a promise of plenty more funds to place it in the very front rank. The plans are embryonic as yet, but the little news now at hand is very highly interesting for the domain of veterinary education in America.

The University of Illinois is one of the foremost state Universities in America, having its home at Champaign and an important College in Chicago. It has over 4,000 students, and is supported by the wealthiest state in livestock in America, and has numerous breeders of enormous wealth who appreciate veterinary science.

Chicago is the greatest livestock market in the world, and being a city of the first magnitude, the prospect for a great college appears very promising. There are illimitable clinical facilities and material, and the college will be able to give practical education in general and military practice, contagious diseases, and meat inspection. Altogether it seems a very important chapter in the history of American veterinary education, and its development will be watched with great attention. Let us trust that it will not be long before some such sum is set aside for veterinary educational purposes in Great Britain, and also that others of the American States will try to rival Illinois.

THE DISCOVERY OF SPIROCHÆTES IN A CASE OF CONTAGIOUS VENEREAL TUMOUR (CANINE).

THE discovery which Professor Mettam has announced on page 80 of the presence of spirochætes in connection with a contagious venereal growth obtained from the vagina of a bitch, may have an important sequel. At all events it opens up a new train of ideas for the discovery of the means of transmission of these troublesome tumours, and the fact that a spirochæte has also been discovered to be present in cases of human contagious venereal disease, may in time lead to the conclusion that various members of this newly-discovered group of micro-organisms are the respective causes of the contagion in each instance. Professor Mettam promises a further note on this subject at an early date, and in the meantime will be glad to receive fresh specimens of contagious venereal tumours either from dog or bitch.

Original Articles.

VETERINARY EDUCATION AND EXAMINATIONS.

BY J. F. CRAIG, M.A., M.R.C.V.S., PROFESSOR IN THE ROYAL VETERINARY COLLEGE OF IRELAND.

ALTHOUGH I had written as much as I had intended on the above subject, I cannot resist the temptation to reply to the epistle of a "Senior Student" appearing in the January number of the VETERINARY JOURNAL. In his article "Senior Student" chiefly refers to the condition of professional veterinary examinations, and after exhaustively weighing up the *pros* and *cons* in connection with the three systems of examining boards, viz.: (1) Examining board consisting entirely of outside men; (2) examining board consisting partly of external and partly internal (teachers) examiners; (3) examining board consisting only of internal examiners (students' teachers only), comes to the conclusion that in the veterinary world the second system is by far the best. In making this inference the writer holds similar views to those of "Syntax," but the data he puts forward in the process require very careful consideration as to whether they are right or wrong. I shall proceed to enquire, and in doing so will take them in the order in which they are stated.

The examining board consisting entirely of outside men, or external examiners, is first dealt with, and it is stated as one of the drawbacks in the system that it leads to a certain amount of false education and cramming, a fact which no one would doubt. But then he proceeds to state that the examinations under such conditions are a mere lottery. If he takes the trouble to honestly study the results of the veterinary examinations, I am sure he will be inclined to modify his statement. For a good student, a man who has the average, or more than average, intelligence, and studied hard through the session, the result of the examination is no mere lottery—it is almost certain that that man will obtain pass marks. The element of chance comes in only when the student knows merely a smattering of his work, and has probably engaged in the method of "cramming," and that element of luck appears whether the examiner is internal or external. The same time will be allowed to examine the student, and the conditions are similar. A good student in either case would have no difficulty in answering most of the questions asked, whereas the indifferent student may or may not be asked questions which he can answer, depending on what part of his subject he has omitted to become familiar with. The internal examiner will be expected to examine the student on his merits at the time of examination, if the external examiner is to have equal powers with the teacher, he must not take the past history of the student into account. The conjoint action of the external and internal examiners will therefore not prevent the false education and cramming which are pointed out as defects in the present examining board. Such a fault could only be remedied if the examiners took account of the class-work of the students then being examined, and such bye-laws will only be of service when the veterinary schools recognised by the Royal College of Veterinary Surgeons are all run on the same lines, and the colleges are not judged by the number of passes obtained at the professional examinations.

Again, the writer attributes to the present system of examination the cause of so little research work being done and so little interest being taken by the student in laboratory work. It seems to me that the mind of the senior student must have been wandering when he dilated upon this point. Surely when a man is only beginning to make himself familiar with the elements of the subject, it is hardly the time for him to engage in research work. Research work can only reasonably be expected in the case of the one who has studied and knows the accepted facts of a subject, and on this account no sensible man would look for the insertion of research work into a four years' curriculum of a veterinary student. Such work could only be taken up after the ordinary course has been completed. That laboratory work is not so well known to the student as it should be, also cannot be put down as a defect peculiar to the present system of examinations. That would depend upon the requirements of the Royal College of Veterinary Surgeons for the schools in the preparation of their students, and upon the system adopted in the school. The course of studies set down and the examination depend entirely upon the code adopted by the Royal College.

As for the want of research work in student days causing the necessity to apply to the medical profession for teachers in veterinary physiology and veterinary pathology, it is hardly necessary for me to give the proper explanation. It is not the one set down by the senior student. His remark on the latter point is without foundation. There is no necessity for applying to the medical profession for a teacher in veterinary pathology. Our profession is quite able to look after that subject for itself. If the reason is asked why medical men appear in certain veterinary schools as teachers in veterinary pathology, then I can only answer that they are either obtained at a lower rate than would attract a veterinarian, or they were attached to a medical school or university before the veterinary school was set up and taken on by a sort of sliding process. In veterinary physiology the teachers are usually members of the medical profession, and the reason is not far to seek. The salaries offered for the teaching of physiology in the veterinary schools would not of themselves maintain a specialist on the subject, and the result is that no qualified veterinarian is forthcoming.

The system of education has nothing whatever to do with it. The system consisting solely of internal examiners is rejected very quickly, and rightly so, by the senior students. It is a system, as he remarks, which endangers the single portal to our profession of which we are so proud.

"Senior Student" next refers to the examining board, which would consist partly of internal and partly of external examiners, and instead of giving a detailed account of its many advantages, says that they are apparent to all, and only refers to one or two which, if they exhaust them, cannot be defined as "many." It is very curious to read this and then turn to the last paragraph in his article, where he notes that the value of opinions without arguments is about equal to the ink used to express them, and emphasises the necessity for bringing forward definite facts for or against an alteration in the present system of examining. Perhaps he will put into practice this advice when he is induced to write another article.

In this conjoint board he thinks that the teacher will take account

of the past work done by the student. As the internal examiner is supposed only to have the same powers as the external one, that cannot be done, and hence this advantage for this latter system cannot be claimed to exist.

Again, the writer replies to some imaginary aspersions against the honour of veterinary teachers in veterinary schools. He says that no teachers having even a small amount of self-respect would hesitate either to reject an unfit candidate or to pass a man knowing him to be deserving of that honour. I think he has failed to grasp the point raised in the previous articles on the subject. At present the veterinary schools in the British Isles depend at least in part for their existence upon the fees of their students, and they are judged also partly on the results of the professional examinations. One would think from the article of "Senior Student" that it is very easy to pick out the wheat from the tares, to separate the fit from the unfit. I can assure him, from the little experience I have gained, it is sometimes indeed very difficult, and the difficulty arises in the case of the man on the border line. It is sometimes hard to know what to do, and I am not so sure but what such a man would, in many cases, get the benefit of the doubt more frequently if one of the examiners were an internal one and the teacher was judged on the results of the pass list. Moreover, the standard of examinations would be bound to vary from school to school, were one of the examiners a teacher in the respective school examined. The standard adopted depends to a great extent on the examiner, and on that account, in the case of external examiners, is nearly the same for each school during one round of the board.

Now, with regard to the subjects of the veterinary curriculum which are discussed in that article, I need only now refer very shortly to the subject of stable management, as I have already dwelt upon it at considerable length in the issue of the VETERINARY JOURNAL for August of last year. I see no occasion to modify the statements I then made. The usefulness of a knowledge of grooms' work to a practitioner is undoubted, but I am of opinion that such a knowledge should be obtained before the student enters upon the veterinary curriculum, and would therefore suggest the inclusion of it among the subjects of the preliminary examination. I don't think, like "Senior Student," that it should be left out of consideration by the Royal College of Veterinary Surgeons. If the latter course were adopted, stable management would be thought too little of by the student.

Last of all, the writer points out some fancied defects in the treatment of the subject of anatomy. He objects to the division of it into two parts, and says it is illogical, but fails to point out in what way. As for the unpractical nature of the division, I have yet to obtain evidence. To me it appears that the separation is a very good one. The portion of anatomy included in the first year's work is the basis of a synthetical study of the subject, and must first be studied even before a dissecting-room knowledge of anatomy is sought. It may not permit of the student becoming familiar with the muscles attached to the bones in the first year, but to my mind it grounds him in the elements of the work which are of service, not only in the further systematic study of anatomy, and also gives him a chance to acquaint himself with the position of the bones in the skeleton and the living animal so as to appreciate the relation of parts and the guide lines which he will require to note in the study of regional or topographical anatomy.

Moreover, although a student has passed his first professional examination, it must not be supposed that he has disposed of these subjects for life. As a matter of fact the passing of an examination must only be regarded as a mark of the attainment of a certain amount of knowledge of the subject examined on. This knowledge is of service to a man who proceeds to study senior anatomy, and then he is in a position to make himself familiar with the use of the markings on bones and the bony prominences which he studied in his first year. If he forgets these points, one must not put it down to the fault of the system, but rather to the fault of the student. In the case referred to by the writer, the point I am trying to make is emphasised, viz., that the students who displayed their ignorance had been "cramming" their work previous to their Class A professional examination.

Anatomy is certainly a very important study for the student, not only because it is the basis on which surgery is built, but also because without it it is impossible to obtain a proper idea of physiology or pathology. In my opinion "Senior Student" is very wrong when he considers that as an adjunct to surgery anatomy would not necessitate much study because of the few operations usually performed. I think if he studies these areas very carefully, he will have a greater amount of ground to cover than he evidently bargains for. Moreover, in practice the knowledge of anatomy is of the greatest service in the examination of animals for structural defects, or in the examination of horses for soundness.

With regard to the examiners appointed, will "Senior Student" point to men who will do their work more satisfactorily and thoroughly than those on the present board, or to any men who are better qualified for the purpose? The Royal College of Veterinary Surgeons selects them, and I am sure would be only too pleased to improve their examinations, their system of education or the examining board, if they thought the suggestions were practicable.

I would only judge the examiners by the results, and have this to say in their favour: that in my experience they have given all the good men pass-marks. With the weak men an element of luck always intervenes, no matter who the examiner may be, and with them the examining board takes very often more trouble than the cases require.

In conclusion, I would like to express the hope that "Senior Student" will take greater care when writing future articles in the making of definite statements on subjects which are under discussion.

"PERIARTICULAR RINGBONE."

BY G. C. LOWE, F.R.C.V.S., DOCKHEAD, S.E.

INTRODUCTION.

IN this country there are still some eminent veterinary authorities who cling to the old belief that the primary lesion in all cases of ringbone is "osteitis," and they believe that the cause of this osteitis is "concussion."

The main object of the present article is to show that in the vast majority of cases the primary lesion is "inflammation of ligament," and that "inflammation of bone" is secondary.

The title "Periarticular Ringbone" has been adopted from Mr. Dollar's translation of Professor Möller's article on the disease.

Definition and Differentiation.—This chronic inflammatory condition of the ligaments of the pastern joint is invariably caused by *repeated* sprains and characterised by irregular enlargement of the pastern about the joint.

In contradistinction to "articular ringbone" it does not implicate the structures within the joint, for even in old-standing cases of periarticular ringbone the articular cartilage is found upon *post-mortem* examination to be intact. Sometimes, however, cases occur in which the two diseased processes are co-existent. It is then found that the disease of the articular cartilage has its point of origin at, or near, the centre of the articular surface, where the shock of concussion is greatest, and that the margins of the cartilage generally remain intact, which could not be if the inflammation of bone at the insertions of the sprained ligaments had any injurious effect on the articular cartilage.

The great prevalence of the ligamentous disease among hard-worked horses of all classes, and the comparative rarity in my experience of the true arthritis known as "articular ringbone," have urged me to devote this paper almost entirely to the consideration of the former.

Exciting Cause.—The idea of "concussion" being the prime cause of all so-called ringbone lesions is quite inadmissible when we come to study the periarticular or ligamentous form of the disease. For in this form not only are the articular cartilages unaffected, but the os coronæ and os suffraginis, after the ligaments have been diseased for years, still show no evidence of inflammatory enlargement except at the points of insertion of the chronically sprained ligaments and the area immediately surrounding them. So evident is this that Col. F. Smith, who, in 1893, championed the theory of concussion, admitted that "the enlarged coronet during life is, in an ordinary case of ringbone, represented on the boiled coronet by a few specks or nodules of exostosis and nothing more, and in fact the swelling we saw during life was largely fibrous tissue, namely, the lateral ligaments of the joint and the extensor tendon, thickened and infiltrated with inflammatory exudate."*

The German investigators who first clearly differentiated the forms of ringbone, at the same time pointed out that the exciting cause of the periarticular form was "continued strain on the limiting apparatus of the joint, or, in a word, *displacement*."†

And it seems to me that other observers, even while they write in support of the concussion theory, also bear witness to the greater prevalence of periarticular ringbone as a result of sprained ligaments. Percivall, for example, in 1823, while contending that concussion is the cause of ringbone and is favoured by short and upright pasterns, nevertheless held that the disease "occurs oftener in the hind than in the fore limb." And Williams, while writing that "as a rule ringbones, like sore shins, are the result of osteitis," stated that "very long pasterns are subject to ringbones," and in such cases he thought "that they arise from sprain of the ligaments." ‡ Captain Hayes, on the

* *Journal of Comparative Pathology*, vol. vi.
† "Möller's Veterinary Surgery." (Dollar's translation.)
‡ "Principles and Practice of Veterinary Surgery."

other hand, contends that "if concussion were a common cause of ringbone, the hind limbs would not be affected so often as they actually are."*

In my own practice, however, among horses whose limbs are subjected daily to great concussion and strain by continued trotting on stone roadways, I find abundant clinical evidence of lameness from chronically sprained and thickened lateral ligaments both in fore and hind pasterns, but rarely any obvious bone lesions or any enlargement actually on the anterior aspect of the joint and unconnected with lateral thickenings.

Among 100 trotting van horses belonging to four firms I have found 51 with thickened lateral ligaments, 49 without any palpable enlargement. Of the 51 unsound pasterns only two have an enlargement on the anterior surface which is unconnected with the lateral thickenings. And my experience is the same among studs of heavy cart horses doing the slowest draught work. In one stud of 70 horses 19 are without any palpable enlargement, 51 have lateral and antero-lateral or postero-lateral thickenings. It will be seen, however, that I find a greater percentage of unsound pasterns in heavy horses working at a walking pace than I do in lighter animals used to trotting.

In *post-mortem* examinations of the enlarged pasterns of heavy railway and carriers' horses, I am struck by the comparative paucity of cases in which the articular cartilages and bones are diseased. An examination of 60 enlarged pasterns in a London knacker's yard showed that in 14 cases both the articular and periarticular forms were present together, and in 46 cases the periarticular was found alone. So small is the share of "concussion" as an exciting cause of ringbone, and so great is that of "displacement."

Predisposing Causes.—As the main predisposing cause of periarticular ringbone I must name the anatomical formation of the pastern joint, which is peculiar to solipeds. Its articular surfaces are comparatively flat, and being incompletely ginglymoid the joint has very limited movement. This natural formation obviously favours "displacement." Should the general conformation of the limb be defective or weak, this anatomical predisposition is greatly increased. For example, heavy-bodied animals with slight limbs, small pasterns, toes turned in or out, or long, weak pasterns, are almost certain to sprain their pastern ligaments. And since defective general conformation of limb is usually inherited, the tendency to develop ringbone is often hereditary. All young animals, moreover, are predisposed to the disease, owing to the immaturity of their tissues. Defective shoeing also is an important factor in causing displacement and consequent sprain of one or more of the pastern ligaments. If a horse's heels are lowered too much by the farrier, and the toes allowed to remain long, the posterior ligaments are thus predisposed to sprain; or if one side of the foot-wall is lowered more than the other, the lateral ligament of the lower side will be liable to sprain. And here I may mention that the practice of bevelling the roadways in town for the purpose of drainage imposes much extra strain on the outer lateral ligament of the left and the inner lateral ligament of the right pasterns of heavy and slow draught horses who have to work close to the near side kerbstone all day long. Again, the material of a roadway is often very prejudicial, since any

* "Veterinary Notes."

surface absolutely unyielding or slippery favours both sliding and side-slipping.

In concluding these general remarks on the causes of the disease, I must express my appreciation of Col. F. Smith's argument that sprains of tendons and ligaments are commonly the result of muscular fatigue.* In my own practice I find that periarticular ringbone is certainly most prevalent in the studs that are habitually overworked, and it seems to me self-evident that, when the extensor and flexor tendons, through fatigue of their muscles, fail to brace the pastern joint, the strain on the ligaments is intense. And this, I think, explains the fact that the disease is often found in horses of irreproachable conformation.

Morbid Anatomy.—In studying the morbid anatomy of the chronically-sprained ligaments it is found that the inflammatory exudate with which they are infiltrated has become organised, and at the points of insertion of the ligaments ossified.

In advanced cases the amount of cicatricial tissue in the ligaments is generally very great, and it forms hard, unyielding fibrous masses, which more or less envelop the joint.

The most diseased ligaments are invariably ossified at their points of insertion, and these exostoses or osteophytes are readily distinguished on the boiled bone by their more bleached appearance. The osteophytes of periarticular ringbone are the product of chronic inflammation, and their appearance and irregularity make them look very different from the healthily enlarged processes and ridges found on the bones of powerfully muscular animals

In the accompanying photographs of a cart horse's os coronæ (left hind) the osteophytes are well marked. Viewed from behind they are conspicuous at the points of insertion of the flexor pedis perforatus tendon and the postero-lateral ligaments, and at the points of attachment of the flexor pedis perforans tendon, or rather of the yellow fibrous band which connects the perforans tendon with the posterior surface of the os coronæ below the glenoidal surface. The osteophytes are prominent along the crescentic line of insertion of this ligamentous band (fig. 1):

On the inner surface of the bone there is a large beak-like process at the insertion of the internal ligament (fig 2). On the outer surface two smaller projections correspond to the insertion of the external lateral ligament (fig. 3). On the anterior surface there is an unusually large mass of osteophytes to which in the unboiled specimen the extensor pedis tendon was firmly attached (fig. 4). The state of this anterior surface is particularly interesting from the fact that the articular surfaces within the pastern joint were quite healthy. Though generally free of osteophytes in cases of periarticular ringbone the anterior surface of the os coronæ is not invariably so (as this case well shows). Not only along the line of attachment of the extensor tendon corresponding to its function as the capsular ligament of the joint in front are the osteophytes numerous, but they cover the whole anterior surface of the bone, and thus plainly show that extensive periostitis had supervened. The appearance of the os suffraginis in this case was in marked contrast with the os coronæ. There were no osteophytes on its surfaces. And in general I find that osteophytes are

* *Journal of Comparative Pathology*, vol. vii.

much more commonly present on the os coronæ than on the os suffraginis, though during life the most *palpable* enlargements on the pastern are frequently the thickened suffraginal ends of the ligaments. Possibly the confined situation of the os coronæ between the lateral cartilages of the foot may aggravate the chronic inflammation of the coronal ends of the ligaments and favour the forma-

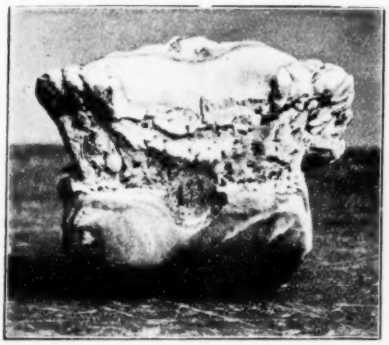


FIG. 1.—Os coronæ (left hind). Posterior surface, showing osteophytes at the supero-external and supero-internal angles and along the crescentic line.

FIG. 2.—Os coronæ (left hind). Inner surface, showing a large beak-like osteophyte at the insertion of the internal lateral ligament. Some of the osteophytes on anterior and posterior surfaces are also shown.

FIG. 3.—Os coronæ (left hind). Outer surface, showing osteophytes at the insertion of the external lateral ligament. Some of the osteophytes on the anterior and posterior surfaces are also shown.

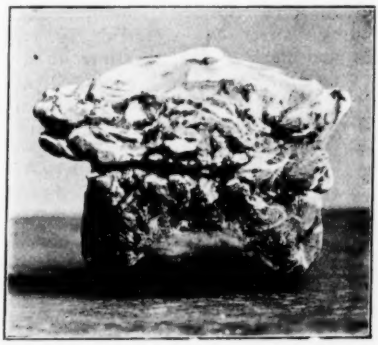


FIG. 4.—Os coronæ (left hind). Anterior surface, showing large mass of osteophytes. The osteophytes projecting from the inner and outer surfaces are also shown.

tion of osteophytes. The relief given in some cases of ringbone by Col. F. Smith's sidebone operation, seems to support the idea that constant pressure on ringbone deposits aggravates the inflammation. In the limb from which the above-described os coronæ was taken, both lateral cartilages were completely ossified.

Symptoms and Diagnosis.—As a rule, in my clinical experience, the earliest intimation of the coming disease is slight lameness only, without

heat of the pastern, without pain on pressure, without enlargement; and this symptom is presumably due to slight sprain of one or more of the ligaments.

It is the exception for acute sprains to be precursors of the disease, but whether the primary sprain of a pastern ligament be slight or severe, it is not in itself sufficient to cause the development of periarticular ringbone, for this disease (as already stated) is essentially a chronic inflammatory condition of the ligaments, which can only be brought about by frequent re-spraining of the weakened structures.*

As a rule, too, the primary sprains occur before the animal has reached maturity, and if slight they are almost invariably ignored by the horse-owner till sprain upon sprain causes the animal's lameness to become too obvious for further neglect. It is not surprising, then, that upon examination as to soundness so many five-year-old horses are found to be slightly lame with slightly enlarged pasterns. In the case of horses with coarse skins and very hairy coronets the diagnosis of incipient ringbone is often difficult, and one has to rely much on the test of turning the horse in short circles. But there is not great difficulty in detecting even very slight irregular enlargement of the pastern in well-bred horses, if their limbs are examined (1) when extended in the same line and bearing an equal amount of weight, and (2) when flexed.

With respect to the very varying amount of lameness present in cases of periarticular ringbone, I believe that it is *always proportionate to the severity of the most recent sprain*—the more aggravated the chronic inflammation the greater the pain. This, I think, explains the fact that a horse with very enlarged pasterns is often found to be much less lame than a horse with slightly enlarged pasterns. In the one case the much-thickened ligaments have not been so recently subjected to overstraining, and consequently their inflammatory condition is for the time at a low ebb. In the other the chronic inflammation has been aggravated by a recent sprain, and the symptoms have become more acute. For the same reasons a horse may at times be most lame on the limb which has the least palpable amount of ringbone.

Though periarticular ringbone in hind feet is very prevalent, the amount of lameness caused by it is slight compared with that caused by the disease in fore feet. This is accounted for by the fact that the weight of the body greatly intensifies every sprain of the ligamentous apparatus in the fore limbs.

Treatment.—The principles of treatment in the early stages of periarticular ringbone should be those which naturally combat the inflammation of a sprain, but, inasmuch as the position of the pastern joint (except in very young animals) makes tight bandaging ineffective, I know nothing better than rest and cold water to constringe the vessels and retard inflammation in cases of ringbone.

Absorbent agents may sometimes stimulate the absorption of inflammatory exudate before it has time to become organised, but, as a rule, the rest which the use of blisters entails is, I think, the real curative agent.

Line firing may cause the skin to contract and act beneficially as a permanent bandage to the sprained ligaments, but in advanced cases of the disease I feel sure that it is futile. Deep puncture firing is said

* *Cf.* the development of "rider's bone" in the tendon of the adductor longus of man.

by Möller and others to be very effective in curing old-standing ringbone, but of this I have no experience.

Apart from the operation of plantar neurectomy, the one remedy which I rely upon is *surgical shoeing*, and the few following cases I trust will serve both to illustrate this treatment and to confirm my general survey of the subject.

CASES 1 to 5 deal with cart horses, and are very old-standing. In each case the horse was used to slow work.

CASE 1.—(A heavy grey cart gelding, aged). When first seen by me about three years ago, this horse was slightly lame on the off fore, and slight irregular enlargement of both lateral pastern ligaments was detectable. In other respects the limb was apparently quite sound, but upright and narrow feet were the weak point in his conformation. The horse did not come under my treatment until eighteen months later. His pastern was then irregularly enlarged on its inner, outer and posterior surfaces. Volar flexion was often pronounced, the shoe worn only at the toe, and lameness persistent though varying in intensity from day to day.

Diagnosing chronic sprain of both lateral and posterior pastern ligaments, I had the hoof of the lame foot lowered and the toe shortened till the hoof axis became parallel to that of the pastern. A plain shoe was then fitted, full at the quarters and heels, to give better foothold to the narrow foot, and thus lessen the strain on the lateral ligaments, and well bevelled (set up) all round the shortened toe to prevent sprain of the posterior ligaments during the last phase of the stride. Though much relieved by this treatment, the horse still continued to limp every two or three strides. Further observation suggested that the uprightness and stiffness of his off fore pastern had in a sense lengthened his limb and made it difficult for him to clear the ground with his foot without straining the diseased ligaments. To obviate this difficulty I had the sound foot (near fore) shod with a specially thick shoe, which raised the hoof about 1¼ inches from the ground. This device answered admirably, and the horse was at once able to advance his unsound limb without stumbling and without pain. During the last eighteen months this horse has continued to work daily without lameness, except upon one or two occasions, when either a strange farrier shod him, or a careless carman bustled him.

CASE 2.—(A heavy brown cart gelding, aged.) Though heavy in body, this horse is light limbed, and both fore feet are markedly pigeon-toed. Previous to my first inspection (nearly eighteen months ago), this animal had been lame for two years, and I found him still very lame on the near fore.

His near pastern presented a prominent enlargement on the postero-internal aspect, and smaller enlargements near the centre of the posterior surface and on the external and the anterior surfaces. Lameness was most marked at the last phase of the stride, and the horse took very short steps, but he had naturally high action, and it was at first difficult to follow his movements diagnostically.

However, he was eventually shod with a plain shoe full at the heels and quarters and set up at the toe, as in Case 1, except that the wall of the foot at the outer aspect of the toe was lowered to a greater extent, and the corresponding part of the shoe was more bevelled, and the inner heel of the shoe was more thickened. At the same time the horse was shod on the sound foot (off fore) with a good-sized full

shoe raised more than an inch from the ground by a stout calkin at each heel.

This treatment has kept him steadily at work for more than a year.

Case 3.—(A heavy bay cart gelding, aged.) A free worker, with very upright pasterns all round. Lame on off fore. Pastern enlarged on posterior and both lateral surfaces. Limb otherwise apparently sound. When at rest the horse invariably pointed with his off fore, keeping the foot flat on the ground and the pastern upright.

Following the same principles as in Cases 1 and 2, I had this horse shod on the lame foot with a plain shoe well bevelled all round the shortened toe, full at the quarters and heels, and thickened up at the heels nearly 1½ inches.

His pastern was so upright that though the horse was naturally not at all low-heeled, it was found necessary to raise the heels to the height mentioned before the hoof axis became parallel to that of the pastern. In addition, the sound foot (near fore) was shod with heels of the same thickness as those of the off shoe. Under this treatment the horse was at once relieved, and he has continued to work regularly for many months past.

Case 4.—(A bay cart gelding, aged.) Limbs too light for a cart horse. Conformation otherwise good. Lame on both fore limbs, more especially on the off. Prominent enlargement on the lateral surfaces, and slight enlargement on the anterior surface of pastern. Shod with shoes well set up at the toe, and extra full at the quarters and heels, but of the same thickness at the heels as at the quarters.

This horse has now worked steadily with shoes of this description for several months. He has a shuffling gait, but shows no sign of pain.

Case 5.—(Heavy bay cart gelding, aged.) Conformation good, except that the fore feet have their toes turned outwards. Lame on near fore. Prominent enlargement on the antero-internal aspect of the pastern.

After the foot had been lowered and the proper direction of its axis obtained, it was found that during movement the outer part of the toe invariably met the ground first, and the inner heel as constantly reached it last.

The outer part of the toe was then shortened with the rasp as much as possible, and a shoe fitted which was much bevelled at this part and sufficiently thickened at the inner heel to prevent the rolling action and secure a regular distribution of weight. It was also found necessary to raise the off foot by means of a special shoe as in Cases 1, 2 and 3. This horse, like the others, now works quite comfortably, unless he is deliberately bustled.

Cases 6 and 7 illustrate the undesirability of lowering the heels in the majority of cases. Of course, if the feet are overgrown, the whole hoof must be lowered as a necessary preliminary, but unless the heels have been left so high by the farrier that it is necessary to lower them in order to make the hoof axis parallel to the phalangeal, I find that the toe is practically the only part which requires shortening.

Even when a horse, with enlargements on the anterior surface of the pastern, deliberately throws his weight upon his heels, I have often found it best not to shoe him (as Williams advocated) with a thin-heeled bar shoe. On the contrary, I prefer to put steel in the heels of an ordinary plain shoe to prevent them wearing down, and, for the purpose of re-shortening the toe which generally grows apace when

there is chronic irritation near the coronet, to remove and refit the shoe once or twice before it is worn out. The essential thing I find is to preserve as nearly as possible the proper direction of the hoof axis.

Case 6.—(Black gelding, 9 years old.) A parcel vanner, used to trotting. Lame on off fore. Enlargements on the sides and partly on the front of pastern. The pastern is very upright, but the horse nevertheless always travels on his heels (more especially on the outer) and extends his toe in a remarkable manner. There are no indications of laminitis, and the horn is strong.

At first I had the horse shod with a shoe thin at the heels and well set up at the toe, but the direction of the hoof axis remained too oblique, and lameness increased. I then tried a shoe with heels an inch thick and quarters tapering to about ¼ inch at the shortened toe. The outer heel was fitted rather wide. This treatment relieved the ligaments at once. The horse is now always shod in this way, and so long as the heels remain inappreciably worn and the toe is kept short, he continues to trot without marked lameness.

Case 7.—(Black mare, aged.) A parcel vanner. Very similar to Case 6. Lame on off fore, with enlargements on the sides and front of pastern, which, however is not so upright. The mare travels on her heels and extends her toe in the same exaggerated manner.

The thin-heeled shoe was first tried, and lameness increased. Then a shoe like the successful one in Case 6, but not quite so thick at the heels. The result has been equally pleasing.

With reference to the use of the horny frog in cases of periarticular ringbone, I find that it is invaluable for preventing slipping when it is so developed that its ground surface is level with the ground surface of the heels of the shoe.

In cases of the disease among nags and ponies, if the frog is too undeveloped to reach the ground without harmful lowering of the heels, I shoe either with tips well set up or with a suitable shoe, plus frog or bar pads.

The shoeing of hind feet troubled with the disease is a comparatively simple matter. The pastern is generally very upright, and whether the enlargements are in front or at the sides or behind, I find it necessary to shorten the toe and keep the heels up. As with fore feet the relation of the hoof axis to the phalangeal must be the guide.

In hind feet with naturally high heels and well-developed frogs, I prefer to keep the frog in contact with the ground, and shoe with plain low level heels and full quarters. When the frog is dwarfed or the heels are naturally low, I shoe with calkins or wedge heels.

In concluding my notes on the treatment of the disease by means of shoeing, I may add that the principles and practice illustrated in the few cases quoted have been far more useful to me than anything else in my incessant struggle with this most prevalent cause of lameness. It is obvious, however, that without the co-operation of a highly skilled shoeing smith, results must necessarily be much less satisfactory. Plantar neurectomy, as a last resort, has in my experience always been successsful with cart horses and others working at a walking pace.

Conclusion.—Prevention, though better than cure, is indeed far from us in our busy, stone-paved cities, but assuredly much may be done to save the wear and tear of pasterns by careful breeding, skilful shoeing, and the avoidance of fatigue.

Clinical Articles.

NOTE ON THE PRESENCE OF SPIROCHÆTES IN AN INFECTIVE SARCOMA OF THE VAGINA OF THE BITCH.

BY A. E. METTAM, B.SC., M.R.C.V.S., PRINCIPAL OF THE ROYAL VETERINARY COLLEGE OF IRELAND, DUBLIN.

PROFESSOR WOOLDRIDGE removed a new growth from the vagina of a bitch received into the clinique on January 21, and the specimen was brought to the laboratory. It was found to be of the usual type of such tumours a round-celled sarcoma.

Smears made from the new growth, fixed in absolute alcohol and stained by Giemsa's stain for twenty-four hours, showed on examination numerous spirochætes. They have, as a rule, five undulations, are pointed at each extremity, are about 17 microns in length when extended, and about ·4 microns in thickness. They only stain faintly, a delicate bluish-pink, and rapidly disappear from the tissues after a short time.

Further particulars will be published in a later communication.

[Professor Mettam would be glad to receive fresh specimens of such tumours. They should be wrapped up in absorbent cotton-wool, without any preservative, and forwarded immediately.—ED.]

INFECTED OPEN TENDON SHEATHS.

BY W. L. WILLIAMS, V.S., PROFESSOR OF SURGERY.

(A series of case reports from the surgical clinics of the New York State Veterinary College.)

THE following cases of infected open tendon sheaths are submitted with a view of illustrating the problem of their handling by radical operative means. We include herein only cases of severe purulent infection of the tendon sheaths which have been handled in the college clinic from the date of its foundation in 1896 up to the present time.

CASE 1 (Clin. Nos. 3,849 and 4,828).—The patient was a four-year-old grey roadster gelding, weighing about 1,000 lbs., and in good general condition. He was entered in our clinic on March 21, 1902, with the history of a dropsy of the tarsal sheath of the flexor pedis perforans tendon (thoroughpin) which had existed for some months. Being quite valuable, if sound, his worth was largely destroyed by the unsightly blemish, but it did not lame him.

The patient was secured on the operating table, chloroformed, and an incision made through the distended tendon sheath, between the gastrocnemius tendon and the tibia, from side to side, and the diseased portion was freely opened. A strip of cheese-cloth, saturated with tincture of iodine, was then inserted through the wound and tendon sheath, and over this was applied an antiseptic pack which was retained by bandages.

After two days the original dressing was removed, and thereafter

the wound was dressed daily in the above manner. The wound healed kindly and promptly, virtually no infection occurred, the animal did not become materially lame and was discharged, much benefited in appearance after some three weeks. The patient made an apparently good recovery and was sold at a moderate price and put to work. The horse rendered fairly satisfactory service for some months, and was started in training during the summer of 1903, when the tendon sheath again showed disease, and the dropsy was soon very much greater than before, and in addition was rendering the animal lame. He was consequently re-entered in our clinic on November 9, 1903. On the following day he was placed upon the operating table, anæthetised, and the operative area thoroughly disinfected. Free incisions were made into the tendon sheath, both through the lateral and median walls, similar to the previous operation, and another incision was made at the postero-inferior part of the tarsus, at the inferior extremity of the sheath. A strip of cheese-cloth, saturated with tincture of iodine, was drawn into the superior wound and along the tendon sheath through the inferior opening, and over this a large pack, saturated with 1 in 1,000 corrosive sublimate solution, was retained by means of bandages.

On November 11 the temperature had risen to 102·4° F., and on the following day it reached 103°. The animal continued to eat well although somewhat lame. On November 13 the temperature reached 103·4°, the appetite was lessened and the animal lay down a large part of the time. It was quite evident that serious wound infection had occurred. On the 14th the temperature mounted to 104·4°, the patient was restless and suffering great pain; the leg swollen and appetite absent. On November 16 the temperature was 104·8°, appetite absent and the animal very restless.

In addition to the application of the antiseptic dressing externally an ounce of quinine was administered. On the morning of the 17th the temperature was 104·6°, patient restless, no appetite, and the bowels were very torpid. A hypodermic injection of 1 grain each of eserine sulphate and pilocarpine muriate was given, and this caused a free evacuation of the bowels. In the afternoon of the same day the temperature had dropped to 103·4°, the animal showed some appetite and was decidedly more comfortable. On November 20 the patient was placed in slings and constant irrigation of the affected part with cold water was applied for several days. The pain and constitutional symptoms gradually abated, and on December 15 the irrigation was discontinued and antiseptic bandages applied.

Improvement was slow and constant from this time forward, and on February 3, 1904, the suppuration had so far abated that a plaster of Paris cast was applied to the affected part with openings at the point from which discharges emanated. On February 7 the patient was discharged with the cast still in position, and it was allowed to remain on for some weeks. At the time of discharge the animal was still very lame and greatly emaciated. Later he improved very slowly in general condition and in lameness, but the enlargement of the tarsus remained very marked although it decreased somewhat. After some months the lameness had almost entirely disappeared and he was put to work upon a retailer's delivery waggon, where he has rendered satisfactory service up to the present date, December, 1906.

The two successive operations upon this case illustrate fairly well the dangers encountered in opening extensive tendinous bursæ, which at the time of operation were not infected. In the first instance we were successful in warding off infection and had apparently good results, which might possibly have been permanent had the patient not been put through the severe trial of track work. In the second operation we had serious and extensive infection of this large sheath which came very nearly proving fatal and left the animal much diminished in value, and useful only for purposes where appearances do not seriously count.

Case 2 (Clin. No. 4,577).—The patient was a seven-year-old light draught mare, used by lumbermen for logging. She was admitted to our clinic on May 2, 1903, with the history that she had a calk wound in the vicinity of the fetlock, late in the fall of 1902, which had healed for a time, but later the animal had become very lame, and at the time of presentation had refused to bear any weight upon the affected member for some six weeks. There was an opening on the posterior part of the fetlock, which communicated with the tendon sheath, and from which there was a discharge of purulent synovia. The opening was injected with tincture of iodine and dressed with antiseptic bandages. An iron brace was attached to the shoe extending to the upper part of the cannon bone, and by the application of a bandage the joint was fixed and the movement of the tendons decreased.

On May 16 a large abscess formed on the posterior part of the fetlock, this was opened and disinfected. Secondary abscesses continued to develop again and again ; they were opened and disinfected, and the general line of antisepsis was continued without material result until June 4, a period of thirty-three days.

The patient was now placed upon the operating table, anæsthetised, and, after shaving and disinfecting the region, the tendon sheath was split open from top to bottom upon the median line. Owing to the anatomical character of this sheath we necessarily divided the flexor pedis perforatus tendon on its median line, from the top of the sheath down over the fetlock into the heel. By drawing the sides apart the perforans tendon could be picked up and laid out on the side of the wound and every part of the tendon sheath easily inspected.

The tendon sheath was packed throughout its extent with cheese cloth, saturated with tincture of iodine, and over this an antiseptic bandage was applied. It was dressed daily in this way for five or six days, when the iodine pack in the bursa was discontinued and merely an antiseptic bandage applied. The effect of this radical operation was highly satisfactory and very marked. There was immediate amelioration of the pain and lameness, and within a very few days the disinfection was clinically complete, all parts of the bursa granulating nicely ; there was scarcely any discharge and in every way the wound was progressing as well as could be desired. Recovery was very rapid and the patient was discharged a convalescent on June 21, seventeen days after operation. At the time of discharge she was walking comfortably with only a slight limp. She was given a brief rest and was then returned to her work in a satisfactory state. So far as we know there has been no recurrence of the ailment.

Case 3 (Clin. No. 4,664).—The patient was an aged roan draught gelding, weighing about 1,300 lbs., and in good general condition, used

in general work by a contractor. It had been bought by the present owner about ten months prior to entrance into our clinic, and had, at the time of purchase, a transverse scar just above the fetlock of the right posterior foot. It was entered in our clinic on May 27, 1903, with the history that an abscess had appeared at the seat of the old scar some three weeks previously, and that this had been attended by a veterinary practitioner without result. When presented at our clinic the animal was unable to bear any weight upon the affected foot, was suffering intense pain and becoming rapidly emaciated.

The horse was placed upon the operating-table, anæsthetised under antiseptic precautions, and an incision was made into the tendon sheath on the median line from top to bottom, as described in the preceding case. The tendon sheath was found to be filled with purulent synovia and intensely inflamed throughout its entire area. The parts were dressed with tincture of iodine upon cheese-cloth in the same manner as the preceding case, and the same plan of after-treatment followed out. The effect of the operation was prompt and highly satisfactory.

Within twenty-four hours the intense pain had abated, the temperature was approaching normal, the general appearance of the animal showed relief, the appetite was good, and from this time on recovery was prompt, rapid, and uninterrupted, and the animal was discharged after about twenty days, walking comfortably, and with the wound almost entirely healed. After a brief rest he returned to his customary work, where he still (December, 1906) is doing his work satisfactorily, without any limp, at a slow pace. There is no visible scar from the operation wound, and the thickening of the joint is no greater than at the date of purchase of the horse.

Case 4 (Clin. No. 6,210).—The patient was a grey draught mare, aged 6, weighing about 1,300 lbs. She entered the clinic on February 12, 1906, with the history that about forty days previously she had been overloaded, after which she became intensely lame in the right posterior limb. Examination showed an extensive distension of the tarsal sheath of the perforans tendon, projecting on both sides of the Achilles tendon, and extending downwards along the posterior border of the hock to the metatarsal region. After disinfection, a series of punctures were made into the distended sheath with the thermo-cautery, and through one of the perforations 2 oz. of tincture of iodine were injected, and over the parts there was applied an ample pack saturated with 1 in 1,000 corrosive sublimate solution.

The part was dressed daily with antiseptics, but in spite of our precautions infection occurred, and on February 21 the temperature had reached 103·7° F., and the lameness had increased. She was given 1 oz. of iodide of potassium. On February 22 the temperature was 103·5°. The iodide of potassium was repeated. On February 23 the temperature had fallen to 103·3°, but it had become evident that serious infection of the tendon sheath existed, and that this was apparently uncontrollable under conservative methods of treatment.

The patient was accordingly placed on the operating-table, anæsthetised, and an incision was made into the tendon sheath at its superior extremity on the internal face of the hock, and a second opening was made at the postero-inferior part of the hock into the extreme lower end of the tendon sheath. With the aid of a probe, a strip of

cheese-cloth saturated with tincture of iodine was drawn through the tendon sheath from above to below and fixed in this position, and over this was applied an antiseptic bandage, as described in the two preceding cases.

The wound was dressed daily along the lines already indicated, and 1 oz. of iodide of potash was given daily until March 2. The temperature mounted to 102·2° on February 24, but on the succeeding days ranged from 100·5 to 101°. After a few days the tincture of iodine was omitted, and merely an antiseptic bandage applied. On March 11 the animal was scarcely lame, and continued thus until March 18, when the lameness returned, and, in addition to the local disinfection, 1 oz. of iodide of potash was given daily internally.

On March 26 the internal administration of the iodide was discontinued, and the lameness was gradually disappearing. After this the improvement was gradual, the lameness being unimportant, and the wound gradually closing; but there seemed a disinclination to heal along the tendons, and the suppuration was persistent. On April 12 the tendon sheath was irrigated with corrosive sublimate solution, and there was drawn through it and left in position a strip of cheese-cloth smeared with an ointment of one part each of cantharides and red iodide of mercury to four parts of lard, with a view to producing an irritation sufficient to cause adhesion between the tendons and the surrounding parts.

This same ointment was applied to the skin over the surrounding parts. The strip of cheese-cloth was withdrawn from the sheath on the following day, and the parts were left undisturbed until April 18, when the animal seemed more lame than previously; continued irrigation with cold water was applied until the 23rd. The progress of the case was unsatisfactory, and the degree of lameness varied from time to time without any definite and permanent improvement until May 2, when the animal was again placed upon the operating-table, and after disinfection and the injection of 10 grains of eucaine beneath the skin of the region, the tendon sheath was laid open freely from top to bottom, a strip of cheese-cloth saturated with tincture of iodine inserted, and over this an antiseptic bandage applied.

After this operation the progress of the case seemed more regular and satisfactory, and the general line of treatment was that of thorough daily disinfection and the application of an antiseptic bandage. On May 21 it seemed that the pressure of the perforans tendon against the most prominent part of the hock was interfering with the healing process, and it was consequently cut in two at this point, so as to relieve the tension. The tendon of the flexor pedis accessorius muscle served to prevent the distal portion of the tendon from dropping down.

The wound now began to heal at this point of resistance in harmony with the other portions. The swelling was decreasing rapidly and the wounds closing nicely, so that the bandages were discontinued, and it was treated as an open wound. On June 15 she had so far recovered as to be discharged, and walked home a distance of about 20 miles without any marked limping.

Case 5 (Clinical Number, 6,470.)—The patient was a two-year-old filly weighing about 1,900 lb. She was entered in the clinic on October 16, 1906, with the history of a barbed wire injury in the region

of the fetlock about one year previously. She had been attended by two different veterinarians, but had gradually grown worse. At time of presentation she was so lame on the affected foot that she would bear scarcely any weight upon it, and was brought to the college, a distance of 20 miles, in a waggon. An examination revealed a fistulous opening upon the postero-external surface of the fetlock joint of the right foreleg, from which there was a discharge of purulent synovia. The opening of the fistula was about 2 inches above the sesamoid bones, and ranged forward into the tendon sheath and thence inward behind the perforans tendon. Owing to the long period of lameness, there was some contraction of the flexor tendons, so that the phalanges were not properly extended upon the metacarpus. The fetlock was largely swollen, and quite sensitive to pressure.

On the following day the animal was secured on the operating table and anæsthetised. After shaving and disinfecting the area, a longitudinal incision was made upon the median line from the top of the tendon sheath, down over the fetlock joint to its lowest part. Upon cutting through the perforatus tendon, it was found adherent at many points to the perforans, while elsewhere the remaining synovial membrane was highly inflamed and suppurating. The tendon sheath was packed with cheese-cloth, saturated with tincture of iodine, and over this an antiseptic bandage was applied. There was no febrile reaction after the operation, and the dressing was left undisturbed until October 20, when it was repeated as before. It was then dressed daily in the same manner until October 23, when the tincture of iodine was omitted, and simply an antiseptic bandage applied after a thorough washing.

The pain in the foot began to decrease upon the third day after the operation. This general line of treatment was continued, the lameness gradually subsided, the swelling decreased, and the wound gradually closed until, on November 6, the lameness was very slight when the animal walked, and the wound had so nearly healed that the bandage was omitted and the granulations were cauterized with nitrate of silver. This plan of treatment was continued until November 22, when the animal walked almost sound and placed the weight squarely upon the sole of the foot, and the contraction of the tendons was slowly disappearing. At this time she was discharged and travelled home a distance of 20 miles.

Case 6 (Clin. No. 6,548).—The patient was a six-year-old black mare weighing about 900 lbs., greatly emaciated. She was entered in our clinic on November 17, having been brought a distance of twelve miles in a waggon. The owner related that she had received a punctured wound, cause unknown, slightly below the fetlock joint, about four weeks previously. Apparently an abscess had formed in the sheath of the flexor tendons, and this had been opened by a country practitioner without due recognition of the character of the trouble. When entered, the patient could bear no weight upon the right hind foot, and showed upon examination of the right posterior fetlock a fistulous opening below the ergot, which penetrated the tendon sheath and ranged upward, and from which there was a copious discharge of purulent synovia. The temperature was 103° F.

On November 20 the patient was secured upon the operating table, anæsthetised, and the area shaved and disinfected, after which an

incision was made on the median line extending from the superior extremity of the tendon sheath down to its inferior end. The tendon sheath was found to be filled with a mass of purulent synovia mixed with blood, and the synovial membrane throughout was intensely inflamed and in some parts necrotic. On a level with the sesamoids the perforans tendon had undergone necrosis and apparently become completely destroyed for a distance of three-fourths of an inch, except a small cord about one-eighth inch in thickness, which was clearly necrotic, and which stretched across from the distal to the proximal end of the living tendon.

These living ends were granulating. The small, necrotic cord stretching between the two living ends parted after about forty-eight hours, in fact, it possessed no strength at the time of operation, and the only reason why it had not parted long before was that the animal placed no weight whatever upon the foot. At the completion of our operation, then, we had the perforatus tendon split longitudinally from the lower third of the metatarsus down to its termination, and the perforans tendon divided transversely on a level with the sesamoids. The wound was well disinfected with 1 in 1,000 corrosive sublimate solution, and the disinfection continued by the application to the sheath of strips of cheese-cloth, saturated with tincture of iodine, and over this was placed heavy packs of absorbent cotton and oakum, saturated with 1 in 1,000 corrosive sublimate solution, and retained in position with tar bandages.

On November 21 the condition of the patient was satisfactory, the temperature 102°, pulse 56, no weight being placed upon the affected foot. On account of the long-standing septicæmia 1 oz. of potassium iodide was given. The dressing was not disturbed. On November 22 the wound was re-dressed, temperature was 102·6°, and the patient received 1 oz. of potassium iodide and 1 oz. of quinine. On November 23 the wound was again dressed, the patient seemed somewhat more comfortable, the temperature was 102·4°, and ½ oz. each of potassium iodide and quinine were given.

On November 24 the temperature was 102·4°, the animal received 1 oz. of potassium iodide and 1½ ozs. of quinine, and the wound was dressed as before. On November 25 the temperature had dropped to 101·9°, and from this time on there was a gradual decrease in the body temperature until it became and remained wholly normal. After this date nothing was given internally to control the temperature. The application of the tincture of iodine to the tendon sheath was discontinued on November 26, and thereafter the wound was washed with 1 in 1,000 corrosive sublimate solution and bandaged with packs saturated in the same material.

The general appearance of the animal improved very gradually, and by December 9, nineteen days after the operation, the animal was bearing an appreciable amount of weight upon the affected foot. Up to this time the patient had experienced some difficulty in getting up when down, because of the intense lameness, accompanied by the great emaciation, and she had generally required some assistance from the groom in rising, but she now gained sufficient strength to rise readily upon three feet. By December 10 the synovial sheath had become completely effaced and all parts were granulating normally. From day to day more and more weight was borne upon the affected

foot, and there was evident a slight tendency for the fetlock to descend because of the division of the perforans tendon, but the adhesions in the sheath were so complete that the change in position was not great.

By December 15 the patient bore almost full weight upon the affected limb when standing, although quite lame in walking. The improvement had been constant in every respect, and at the present date, January 1, 1907, the mare has increased in weight and general appearance, the swelling in the diseased area has largely disappeared, only a small granulating surface on a level with the skin remains at the seat of operation, no discharge is present, the animal is bearing almost normal weight upon the foot, the descent of the fetlock is unimportant, and the patient is essentially convalescent.

Remarks.

These six cases of purulent open tendon sheaths illustrate very well the principles involved in the radical treatment of this very serious injury. Four of these cases were due to infection from some sort of accidental wounds, while the other two were the results of unsuccessful surgical operations of a more conservative character. The essential problem in the treatment of infected tendon sheaths is that of disinfection, and we have tried to show by these cases an effective means for bringing about this end. There has been but little variation in the essential lines followed in the different cases, except in the cases of Nos. 1 and 4, where it was attempted to disinfect the tarsal sheath by means of counter-openings instead of by laying the sheath open from end to end, and a study of these two cases will show how inefficient such a plan of treatment becomes in comparison with laying the sheath open freely. This comparison is heightened by noting the change in the progress of No. 4, where after a long and tedious effort we had failed to secure results by the counter-opening method, but which were quickly obtained when the sheath had been laid open from end to end.

This observation greatly emphasises a common principle in surgery, that we should relieve compression and friction as far as it is possible between inflamed surfaces. The importance of this friction and compression upon the behaviour of diseased parts is further illustrated in Case 4, where we were obliged to divide the tendon of the perforans muscle where it played over the base of the os calcis, at which point the disease was very obstinate up to the time when the tendon was divided, and after which its progress was prompt and highly satisfactory.

In these cases I have made no use of the newer and highly lauded disinfectants, but we have relied upon two of the oldest in the practice of surgery, iodine and corrosive sublimate. We depended constantly upon the liberal application of the pure tincture of iodine to disinfect and destroy the diseased and synovial membranes.

Internally, also, where there was marked febrile disturbances or where there was septic infection, we have again relied upon two old remedies to overcome the general disturbances of the system, and have administered quinine and iodine in the form of potassium iodide. It will be noted that the dosage of these two remedies has not been in accord with those prescribed by writers upon veterinary materia medica, but have been considerably in excess of the usual doses. We

find that a horse of 1,000 lbs. will readily stand 1 oz. or 2 ozs. of quinine daily for several days before it finally induces severe purgation, which is usually the first symptom of quinine poisoning in the horse; and we also find that it is almost impossible to produce this toxic effect so long as the septic conditions persist. The horse is even more immune to the iodide of potash, and we find that 2 ozs. or more daily to a horse of 1,000 lbs. will not produce iodism until after four to six days, and even then the toxic effects are neither marked nor of any great importance, and consist chiefly of a loss of appetite.

On the whole, we would conclude from these cases of severe infection of the tendon sheaths that the radical treatment of opening freely from end to end is justified by the results, but we would also note that in our judgment it is inadvisable to make such an operation except where the patient can be under continuous observation by the veterinarian, and the most scrupulous care be given in disinfecting and dressing the wound daily, and watching and overcoming promptly every unfavourable symptom which may arise.

A CASE OF FILARIA OCULI IN AN ENGLISH HORSE.

BY C. W. TOWNSEND, M.R.C.V.S., LONG STANTON, CAMBS.

THE subject of this note was a dark brown eight-year-old Hackney mare, which had been used for showing purposes, but was now used for breeding. I was requested to examine one of her eyes, which the owner informed me discharged a good deal, which latter, running down the side of her face, made it appear unsightly. Upon examination of the right eye, one could easily discern floating about in the aqueous humour what appeared to me to be a small round worm. At this time the cornea was quite clear, and although the affected eye was somewhat sensitive to light (photophobic), yet beyond this the sight did not appear to be impaired, and its general appearance was normal. As the mare was quite near home I frequently called and examined it, I also showed it to two neighbouring veterinary surgeons, whose opinions I may add coincided with mine. In about a month from the time my attention was drawn to it, I noticed for the first time a change in the general appearance of the eyeball, which now showed signs of inflammation, the cornea was gradually losing its transparency and becoming opaque, the aqueous humour assumed a milky tint, photophobia now more marked, and these symptoms, after persisting more or less for a couple of months, gradually subsided, by which time vision of the eye was completely destroyed, although the dead worm is still visible in the anterior chamber, but now somewhat atrophied and changed in appearance, and the opacity of the cornea is not so marked.

Remarks: I am inclined to think this condition is very rare in this country, although I believe it is fairly commonly met with in certain parts of India (this animal had always lived in England). No doubt puncture of the cornea and extraction of the worm might have been attempted in this case, but not having previously met with such a case, I could not give the owner any satisfactory results of this operation, which was partly the reason no operation was tried. I should therefore like to ask readers of your Journal who have met with similar cases what results they have obtained from this operation.

A CASE OF TUBERCULAR MENINGITIS.

BY H. GIBSON, B.A., M.R.C.V.S., BELFAST.

ON September 16 I was called to see a roan shorthorn calf, aged 6 months. As it appeared stiff and I thought it had got hurt across the loins by other cattle jumping on it I ordered it to be rubbed with embrocation.

Then I left home and did not see it for three months, but from the history I gathered that it improved for a few days, but then gradually got worse. At first it rose with difficulty, then it required assistance, and when I saw it on December 24 it was unable to stand, so I started to treat it for rheumatism until January 4, when it started to show brain symptoms by recurrent fits, &c. I now diagnosed the case as one of tubercular meningitis, and ordered it to be slaughtered. This was done on January 8, and I held a *post mortem*, which verified my diagnosis. I found the mediastinal lymphatic glands badly affected, also a peritonitis and meningitis of a quite recent date.

In making enquiries about this calf I found it was bred from pure shorthorn stock, and had always been fed on a large quantity of milk. This I found had mostly come from a cow which has since reacted to the tuberculin test, hence the cause of the trouble.

This is another instance to show the spread of tuberculosis by milk. The mother of the calf did not react to tuberculin.

TETANUS IN A DOG.

BY A. C. DUNCAN, M.R.C.V.S., PROFESSOR IN THE ROYAL AGRICULTURAL COLLEGE, CIRENCESTER.

SEEING a case of tetanus in a dog recorded in the December number of the Journal by Mr. Hughes, of Woodstock, I thought that the following notes of a similar case might have some interest, and it has always seemed to me somewhat strange that canine tetanus is not more common, especially in hunting dogs, which are so liable to cuts and scratches about the feet and legs.

Subject.—A hound, one of the Royal Agricultural College pack of beagles.

History.—This dog had been hunted with the pack on Saturday, November 24. On the following Tuesday the Master told me that the dog seemed very strange, that he was walking very stiffly, his tail straight out like a rod, and was unable to eat his food properly.

In this condition I found him the same evening. He seemed otherwise healthy and willing to eat, but was able to take only a little soft food, and that with difficulty. I sought for a wound and found only a few apparently trifling scratches about the legs.

Treatment.—I administered hydrarg. subchlor. 5 grs., and prescribed quietude and isolation in a darkened horse box, soft diet, and pot. brom. 6 grs. in solution three times a day.

He became progressively worse, and on December 7 he was unable to stand or eat, the jaws firmly locked, the limbs stiff, and muscles hard. The case seemed hopeless, so I advised destruction.

At the request of the Master I made a *post-mortem* examination, which, as I anticipated, revealed nothing visibly wrong.

PECULIAR POST-PARTUM SYMPTOMS IN A COW.

BY SPENCER BLACK, M.R.C.V.S., CLONTARF, DUBLIN.

The subject was a Shorthorn cow, in good, or rather fat, condition. I was called in urgently to see her early one morning, about thirty hours after she had had her fourth calf. She had calved fairly easily, and on this particular morning when the cowman went to her she appeared very ill, refused all food, and was trembling all over.

When I arrived she appeared very distressed, and exhibited the following symptoms: back arched and abdomen rather tucked up, patchy sweats over the body, lashing of the tail, paddling of the hind feet, respirations blowing, extremities cold, pulse weak and small, and temperature normal. Her eyes were staring and pupils dilated, and she was restless and excited. She defæcated freely and the fæces were normal in appearance. At this stage I suspected that these were the premonitory symptoms of milk-fever, especially as the cow was an apparently likely subject. When she was made to walk round the house she staggered about at first, but on an opportunity occurring she dashed through the doorway, and after a staggering gallop around the field, she was with difficulty driven back into the house. I again examined her closely, but was unable to satisfy myself as to the cause of her trouble.

As a palliative measure, and to overcome the excitement, I gave her chloral hydrate ℥j. It was very difficult to drench her, and she threw herself down twice during the process. I then left the cow, and returned about five o'clock in the afternoon, when to my surprise I found her apparently quite well. She had stopped blowing, and her extremities and body surface were nice and warm, pulse and temperature normal, and she had commenced to feed. Since then, which is a week ago, the cow has been apparently perfectly healthy, feeding and milking well. The only question which remains to be answered is: "What was the condition?"

AN INTERESTING SUCCESSION OF RECOVERIES FROM MILK FEVER IN A COW.

BY R. WAGHORNE, V.S., EDENBRIDGE.

It is not often that the opportunity presents itself for being able to record three successive recoveries from milk fever in the same cow, especially when that animal is a well-bred Jersey.

The patient in this instance was a pure-bred Jersey, aged 10, and had her first attack in March, 1904, after her fifth calf. She went down on the second day and showed all the characteristic symptoms, becoming unconscious, moaning, and turning her head to her side. After emptying the udder and injecting a drachm of potassium iodide in water, I propped her up comfortably on her sternum and administered a quart of oatmeal gruel with 4 ounces of solution of aloes and a pound of treacle, repeating this every four hours till the bowels acted.

She made an excellent recovery, but lost the use of two quarters of the udder until after she had calved again the following year, when their functions became restored. In 1905 she had twin heifer calves

and dropped on the third day. She was treated as in 1904 and got up on the fifth day. During her full milking period she gave an average yield of from 20 to 22 quarts of milk a day.

In August, 1906, she had her third attack, after giving birth to a bull calf. She had calved on the Sunday evening and appeared to be progressing well until about nine o'clock on the following Tuesday morning, when she began to stagger about and show all the symptoms of an approaching attack of milk fever. I was hurriedly sent for and at once emptied the mammary gland, injecting air on this occasion and inflating and massaging the udder very thoroughly. She dropped down suddenly during the process. I gave her enemas and treated her internally as on the two previous occasions. This time she made a much more speedy recovery and was soon on her legs again. She is a heavy milker, and although at the present time only giving some 14 quarts, she has yielded as much as 19½ quarts a day.

A CASE OF INTUSSUSCEPTION AND PAPILLOMATA OF THE ŒSOPHAGUS IN A COW.

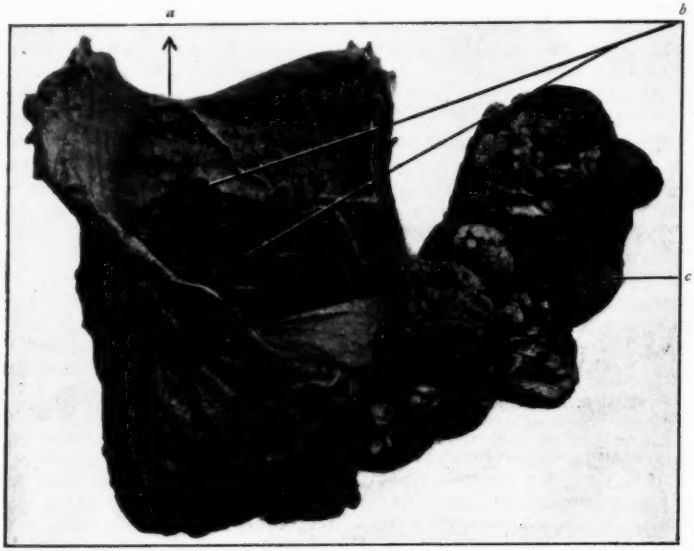
BY A. E. METTAM, B.SC., M.R.C.V.S., M.R.I.A., PRINCIPAL OF THE ROYAL VETERINARY COLLEGE OF IRELAND.

A SPECIMEN was recently forwarded to me by Mr. E. C. Winter, F.R.C.V.S., of Limerick, which is of so great interest and unique in my experience, that a description of it may be of interest. I cannot do better than quote from the letter forwarded by Mr. Winter when sending on the specimen, as it gives all the particulars of the case available. "I am sending you by this post a specimen taken from the lower end of the œsophagus of a cow. The patient had been ailing for some time and treated for inflammation of the lungs, and up to a few weeks ago swallowed food without any difficulty. Since that time feeding and rumination have been attended with difficulty, and only in the last fortnight was the swelling near the chest detected. I give you the history of the case as I got it. I did not see the patient."

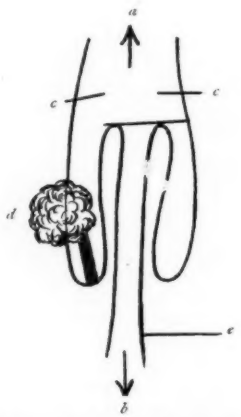
The specimen on arrival was about 6 inches long, and flattened. For some time I could not exactly determine what I had got. On making an incision into it I recognised that I had indeed got an interesting specimen. The œsophagus was dilated and attached to the mucous membrane, and lying upon the invaginated tube was a papillomatous new growth. This is represented thrown on one side in the photograph, but the thick white pedicle connecting it with the mucous membrane of the œsophagus can be made out. The inner tube is the intussusceptum, and unfortunately, whoever removed the specimen from the body, cut too close and severed the gullet at the point where its lumen opened into the intussuscepting portion of the œsophagus. The portion continuous with the gullet passing upwards to pharynx had been withdrawn and removed.

The papillomatous new growth was the cause of all the mischief. Such growths are not uncommon in the œsophagus, and a very good illustration of such a lesion is found in Kitt's "Lehrbuch der Pathologischen Anatomie der Hausthiere," Band 1.

The new growth pulling upon the mucous membrane of the œsophagus, caused a kinking inwards of the wall, and then followed the invagination of the tube immediately above. The new growth exerted traction upon the wall downwards towards the stomach.



Œsophagus of a cow, showing papillomata and intussusception.
a.—Way to the stomach. *b.*—The intussusception. *c.*—Papillomata.



Diagrammatic view of the intussusception.
a.—To the stomach. *b.*—To the pharynx. *c.*—Incision made here.
d.—The papillomatous growth. *e.*—This part has been withdrawn.

From the size of the new growth it is difficult to understand how the animal continued to feed and ruminate for so long before the intussusception occurred, because I believe the latter only arose during the last few days of life. The condition is certainly most unusual, and, as mentioned above, in my experience unique, and at all events worth recording.

THE CRUSHING OF CATTLE BY THE KANDYANS.*

BY T. B. POHATH-KEHELPANALA.

THE art of crushing or "mulling" cattle as practised by the Kandyans dates from very ancient times. The operation is performed when the animal has reached its prime. This period of its life is known as "Karanegima," literally the age at which the neck gets fat and fleshy; it is at this stage that the animal becomes inflamed with passion.

The action of crushing called "Karabima" or "Vedakan Kerima" is performed by a skilled operator, with the help of a trained assistant. It is never performed on a buffalo bull before it reaches its fifth or sixth year, nor is it undertaken before the animal has been used for ploughing. Unless the animal is subjected to this ordeal during the fattening period, it invariably becomes weak and emaciated, and utterly unfit for work; while in some cases, the effects are fatal. The act of wasting flesh and reducing the animal to leanness is described by the Kandyans as "Telendirima."

A lucky day is chosen for the operation. The month of *Il* (November) is considered a favourable period. This is the holiday season for the Kandyan agriculturist; there is abundance of fodder to be had everywhere, and the animals have no work before them until the harvesting season in March and April.

Punctual to the appointed hour, a pair of well-seasoned rounded bars of the Kitul (*Carvota urens*) or Kohomba (*Azadirachta indica*), like rulers, about 1½ cubits long, are laid on a "Malbulat-Tattuwa"—an ornamental betel tray—and are fumigated with resin. The wooden bars are tightly bound together at one end with kitul fibre. A vessel filled with saffron water is placed close by. The animal has to have its legs bound, is thrown over on its side, and held securely to prevent it struggling.

After making a supplication to the presiding deities, the wooden bars, called "Paluassa" by the Kandyans, are placed on each side of the testicles, and are firmly pressed together until the glands get entirely crushed. As a general rule, a very small portion is left unsqueezed, with the object of maintaining the health and vigour of the animal, but in the case of a buffalo that is exceptionally savage, the glands are completely crushed. The operator is known to possess a secret method of applying pressure, by which he is able to reduce the glands to varying degrees of pulpiness or consistency, so as to leave the animal, after the operation, thoroughly docile, a strong worker, or with a certain amount of temper. The crushing is always

* Abstract from *The Tropical Agriculturist*, of Ceylon.

attended with successful results. It restores healthful functions to the body, and animals improve in strength and endurance.

When the operation is finished, saffron water is sprinkled over the animal, and with a red hot iron some parallel or ornamental lines are branded on the loins, flanks or tail. This is supposed to invigorate the animal and to counteract disease.

As a result of the operation, severe inflammation, of course, sets in, and the animal suffers from pain, fever and exhaustion. For about a fortnight it must be kept in a shed protected from cold, and very carefully looked after, lest, followed by the smell, crows, flies and kabaragoyas (*Varanus Salvator*)—especially the latter, who, attracted by the scent, travel from distances—should attack and prey upon the inflamed parts. Burnt domba (*Calophyllum inophyllum*) ground with kekuna (*Canarium Zeylanicum*) oil into a paste are generally rubbed over the swollen glands to allay the pain and reduce the inflammation. Sometimes, previous to the operation, the leaves of the pennela (*Sapuidus emarginatus*), turmeric, and the tubers of the haran-kaha (*Curcuma longa*) are pounded to a pulp and smeared over the parts.

At the end of a fortnight the animal is removed to a spot where there is mud and water, and food is given at regular intervals, until the animal completely renovates his lost strength, and gets energy and tone to his body. In about two months it should be perfectly well again, and fit to begin the long spell of work before it, and to continue working till incapacitated by old age, accident or disease.

The same process is adopted in the case of black cattle also.

The operator is sometimes remunerated by one or two rupees in cash, in addition to being handsomely entertained to Kiribat and Keun, and a meal with five curries.

TUBERCULAR MASTITIS AND ITS RELATION TO THE MILK SUPPLY.

BY A. E. PAYNE, F.R.C.V.S., WEYBRIDGE.

As members of the veterinary profession it behoves us to use our influence and exercise all possible care to prevent the transmissibility of all diseases, particularly that scourge of the human race, tuberculosis, from animals to man. This can only be carried out by periodic examination by veterinary surgeons, of all cows supplying milk for human consumption.

It is said that about 2 per cent. of all dairy cattle have tubercular udders, therefore there can be no possible doubt that a certain amount of milk containing the tubercle bacilli is consumed, principally by infants, and adults when their bodily health is in a receptive condition for the entrance of the virus into their tissues, for milk is one of the principal foods for invalids.

Scientists nowadays recognise two distinct types of tubercle bacilli, viz., the *typus bovinus* and *typus humanus*, having distinct morphological characteristics. But man is highly susceptible to the bovine germs, and it has been shown by various bacteriologists such as de Jongh, Hamilton, Young, Ebro, and others, also the Royal Commission on

Tuberculosis, that in those cases pointing to intestinal primary affection the organisms found were of the bovine type, proving that these cases had been caused by the ingestion, probably, of milk from a tuberculous cow.

I have taken the following from a report on human and bovine tuberculosis, read at the Paris Congress on Tuberculosis, 1905:—

Tubercle bacilli of the *typus bovinus* appears chiefly in tuberculous lesions in children, and among our cases we found that with one single exception it was the mesenteric glands or intestinal ulcers that contained the bovine germs. When, on the other hand, the sputum of adults suffering from pulmonary phthisis (the most widespread form of tuberculosis) was examined, only bacilli of the *typus humanus* were found. That the tubercle bacilli of the *typus bovinus* can, however, also enter the adult body, was ascertained by our finding them, together with those of the *typus humanus*, in a case of extensive tuberculous ulcers of the intestines of a woman.

If the health of the general public is to be taken into consideration at all, it is absolutely necessary that we should have suitable and adequate inspection of all dairy cattle.

About two years ago I was appointed by two urban councils to inspect and report on the milch cows in their districts, and what I saw on my first visits was simply appalling. The teats of a cow at one farm were covered with ulcers ranging from the size of a threepenny bit to a florin; these ulcers had thickened edges and were raised above the surface of the skin and covered with a muco-purulent material, which was washed off by the milker's hands into the pail. I saw cases of leucorrhœa in cows which were emaciated, and the discharges were plastered down the quarters on to the udders. Another cow had paralysis of the tail and inability to retain her urine; one can guess the condition the udder was in. Six or seven were affected with different types of mastitis. Besides these cases the cows were more or less in an unthrifty condition, with dirty flanks and udders. Of course at some of the farms the cows were well cared for and in good condition.

According to the Registrar General's returns for the last thirty years there is a marked decrease in deaths from phthisis; but during that same period a distinct increase of deaths in children under one year, due to tabes mesenterica.

Deaths from phthisis occur between the ages of 20 to 40; from tabes mesenterica, under 2 years. Sir Richard Thorne says that the loss of child life from drinking tubercular milk is appalling.

Dr. Scursfield says that tuberculosis of bowels is one of the most fatal diseases of childhood.

Dr. Bimcock was investigating in Dr. Delepine's laboratory the cause of chronic wasting due to improper feeding. He selected thirteen cases in which he found no symptoms, on *post mortem*, of tuberculosis, and where there was no history of that disease in the parents. Dr. Delepine was not convinced, so he made a microscopical examination of the glands, and found that out of the thirteen, seven showed signs of tuberculosis in the mesenteric glands. He mentions that it was interesting to note that the only clear lesions were found in children over ten months.

Drs. Woodhead and McFadyean found caseation of the mesenteric

glands of children in 79 per cent. of tubercular children in their report to the Congress of Hygiene. They examined 127 cases, and found the mesenteric glands as mentioned above in 100. Dr. Still found that in 769 *post-mortems* on children under 12 years of age, at Great Ormonde Street Hospital for children, 269 revealed tubercular lesions, and no less than 230·4 showed evidence of primary affection by way of the alimentary tract. Widerhöfer in Germany found 101 out of 418 cases of tuberculosis in children to show evidences of primary affection through the intestines: 42 per cent. of these cases of intestinal tuberculosis were in children between the ages of 2 and 5 years. Dr. Shonnan estimated that 28·1 per cent. of tuberculosis in children are due to alimentary infection. In America, Dr. Northrup and Dr. Blackader have shown that tuberculosis in young children, especially abdominal, is remarkably rare, yet tuberculosis in general is about as common as it is in European cities.

Now this is particularly interesting and worth noting, and goes a long way to prove that the huge quantities of deaths of young children in this country is due to primary alimentary infection. For (as pointed out by J. G. Adami, in a paper by him, published in the *Montreal Medical Chronicle*, and reproduced in the *Veterinary Record*, November 29, 1902) advanced bovine tuberculosis is extraordinarily rare in that neighbourhood. It therefore follows that tubercular mastitis must be very seldom seen.

It has been said that if alimentary infection with tubercle were primary, the mucous membrane and intestine itself would be affected. This is not the case, as investigations have proved, for animals fed with tubercular material show no lesion of the bowel, but the mesenteric glands always show signs of invasion from induration to caseation. We know that there are cases on record of tubercular lesions of the bowel, but in my opinion this points to either the ingestion of an enormous quantity of the bacilli, or to a former lesion from some cause or other, which forms a breach, allowing the entrance of the bacilli or their products into the weakened tissues.

Some years back I was requested to pay a visit to a herd of Jersey cows; the owner had lost several and many of the remainder were very poor, and two or three of the older cows were extremely emaciated. I diagnosed tuberculosis and advised our client to have them tested with tuberculin. He agreed to do this, and I accordingly injected the whole herd—fifteen in number. All but two reacted. Our client was not convinced, so I advised that two or three of the emaciated cows, one with an advanced tubercular udder, should be destroyed. This was carried out and the test verified. One of them had a tuberculous area in the wall of the heart. The cow with the diseased udder was a splendid example. Koch's bacillus was demonstrated under the microscope.

Now we come to the most significant part; three children on this estate died from a wasting disease. I forwarded to Sir J. M'Fadyean from this same farm a tuberculous calf about 4 months old.

If the milk coming from a tuberculous cow or udder is not the vehicle of this disease, what is the cause of the alarming quantity of tuberculosis of mesenteric glands, &c., in children? The extreme virility of the bacilli from a bovine source has been proved over and over again. All young animals, monkeys included, succumb much

more quickly when fed or injected with the organisms from a cow than a human source.

Such diseases as epidemic diarrhœa, sore throats, &c., in children and adults are caused frequently from the ingestion of milk coming from a cow suffering from an affection of the udder,* yet a calf taking this same milk comes to no harm. Why is this? I take it that the cells of a child, or adult, for that matter, have not the same power to resist disease as that animal. Many experiments have taken place to show that tubercle bacilli from a human source is non-infective, under certain conditions, to animals. Its sojourn in a human body has depreciated its strength, the cells of the human host falling an easy prey; the progeny, therefore, is not so strong as the parent bacilli; and when introduced into an animal the cells of the latter are able to repel the invasion to a certain extent.

From the foregoing evidence, there can be no possible doubt that a certain percentage of cases of tuberculosis in children, at any rate, is due to primary intestinal infection. In the case of adults it is rather a difficult matter to prove cases of intestinal primary infection, as before death takes place it has spread to the thorax. In cases of tubercular chest glands, is it not possible for a certain amount to arise from the ingestion of tubercular material? the organisms in their passage adhering to the throat and passing through with the lymph to the pharyngeal and so on to the bronchial lymphatic glands.

As to the frequency of tubercle bacilli found in milk. Bearing in mind that there are many cows clinically affected, and about 2 per cent. with tubercular udders, it follows that the bacilli must often be encountered in the milk as sold to the consumer. In my own personal experience this percentage of tubercular udders is not so high. I inspect the cows at about seventeen dairy farms four times yearly, averaging twelve to fifteen cows per farm. It has been proved by certain observers, such as Ostertag, Bang, Nocard, Bollinger, &c., from investigations and experiments, that we are practically safe in using the milk from cows unless they are the subject of tubercular udders or clinically affected, although they may re-act to tuberculin. Nocard tested the milk of eleven tuberculous cows with sound udders and found only one infective. This cow was afterwards found to be the subject of tubercular mastitis. May tested the milk of five clinically affected animals with sound udders but without result. Bang inoculated forty rabbits with milk from twenty-eight clinically affected animals with sound udders, and in only two cases was the inoculation followed by positive results. He carried out feeding experiments in five young pigs with milk from tuberculous udders, and produced tubercle in all five.

Lucas fed four pigs with milk from a tuberculous udder, and all four became infected. In 1898 Ostertag carried out experiments on cows reacting to tuberculin, to find out if their milk contained tubercle bacilli. He took fifteen reacting animals, fed and injected guinea-pigs with the milk, but without result. Other experiments were carried out by him with mixed milks. He summarised by saying that the milk of cows which have reacted to tuberculin may occasionally

* See *British Medical Journal*, 1881, vol. i., p. 657; vol. ii., p. 415. Ninety schoolboys attacked at Rugby School. Traced to cow with mastitis. Dover, 1894; 205 persons. Every house supplied with milk from a certain farm was affected.

contain tubercle bacilli without necessarily acting injuriously when it is used for feeding.

In both series of experiments no tubercle bacilli could be seen under the microscope, in preparations from the precipitate of the contrifugalised milk. He also observes that a single dose of milk containing tubercle bacilli does not produce tuberculosis when it is taken in by the mouth.

Nocard also says that we can only induce tuberculosis by injection when the material is very rich in bacilli and a large quantity of it injected. Knuth, of Berlin, fed guinea-pigs with tuberculous milk in various doses, from 120 grammes to 300 grammes, and found that animals receiving less than 15 grammes remained healthy, while those receiving a bigger dose died.

G. Leslie Eastes, in a paper called "The Pathology of Milk," read before the British Medical Association of Portsmouth, says:—"The presence of tubercle bacilli in milk is an absolute indication of the existence of a tubercular lesion of the udder. The animal may be tuberculous, but till the udder contains breaking down tubercles, no bacilli are passed in the milk." He microscopically examined 186 samples of milk, and found tubercle bacilli present in eleven. What he means by breaking down tubercles I don't quite know; unless it is caseation or after necrosis has set in, which would indicate that the invasion was one of old standing, and, as pointed out by Sir J. M'Fadyean and others, the first change which takes place is enlargement of the interacinus spaces; and before this happens the bacilli are passed with the milk in enormous quanties.

We all know that a tuberculous udder may be passing milk containing the bacilli before it is possible to detect any appreciable change in the gland.

Stenstrom experimented with fifty cows, all reacting to tuberculin; some showed clinical symptoms. The milk, collected under suitable conditions, was inoculated into sixty-eight rabbits and fifteen guinea-pigs. One rabbit died from peritonitis. None in *post mortem* proved to be infected with tuberculosis.

Dr. Delepine, with other bacteriologists, collected fifty-four samples of mixed milks in Liverpool; three contained the tubercle bacilli. They collected from the country dairies 125 samples of mixed milks; in these, twenty-two contained the bacilli. The disparity in numbers of samples containing Koch's bacillus in the town and country dairies is easily explained—the cows in town dairy farms are periodically inspected by veterinary surgeons, not so the country ones. This goes to prove conclusively that weeding out of cows with tubercular udders and those clinically affected can help to produce milk practically free from the bacilli.

Bang found tubercle bacilli present in 14 per cent., Ernst in 25 per cent., Klein in 7 per cent., Boyce in 6 to 8 per cent. in town and 17 per cent. in country; in Islington in 1899, 14 per cent.; in Hackney, 22 per cent.; and in Croydon, 6 per cent.

All the foregoing data go to prove that by careful examination not less frequently than once in four weeks of all dairy cattle supplying milk, and condemnation of all clinically diseased animals and those affected with tubercular udder disease, transmissibility of tuberculosis through the milk can practically be put a stop to, and its propagation in other ways incidentally prevented.

We will now consider the principal symptoms one expects to meet with in dealing with a tubercular udder. It takes the form of a cold, painless, slowly-growing interstitial inflammation. A few weeks may elapse from the time the udder is first invaded before it is possible tc distinguish clinical symptoms, also before there are any appreciable changes in the milk; but during this period tubercle bacilli are secreted with the milk. In fact, at first there is an increased quantity of milk, due to the stimulation of the milk-secreting cells by the bacilli and their products. One of the hind quarters is usually affected, or it may be both.

Some observers say that the bodily condition of a cow is no indication; I have never seen a tuberculous udder unless it was associated with emaciation. In the case of a tuberculous udder unassociated with general clinical symptoms I should be inclined to think that invasion had taken place by the teat canal. If by either of the remaining channels, blood or lymph, constitutional disturbance would be bound to follow, and consequent falling off of condition. Fünkstuck, who first described tubercular mastitis in 1870, says he has never seen a case without generalised tuberculosis. The skin retains its normal colour, and is not adherent to the underlying tissues. The affected gland or glands become gradually bigger and harder; there is entire absence of heat or pain.

The foregoing symptoms are usually accompanied by enlargement of the corresponding supra-mammary lymphatic gland, occasionally nodular in character. The milk at first becomes thin and watery, and then a yellowish clear fluid containing flocculi is secreted; which, later, is thick and of a yellowish tint. I have never felt the marble-like tumours which some observers describe as being present when the disease is in its early stages.

Owing to the interstitial character of this form of mastitis, in many cases the enlarged interstitial walls which divide the affected quarter from its fellows can be felt as ridges at the lower end of the udder. As the disease progresses, so the invaded gland continues to increase in size and density, and in time no milk is secreted, due to the squeezing out of existence of the milk-secreting apparatus.

As first pointed out by Bang, inflammation of the udder from all causes (excepting actinomycosis) is followed by a reduction in size of the affected organ; not so tuberculosis, the gland retaining its volume and density.

Bang says that the secretion from the udder becomes purulent in time. Fünkstuck that it is never purulent. Storch has analysed the milk from an affected gland, and found it deficient in fat, sugar, phosphorus and lime salts, but rich in soda and albumen.

Accompanying these local symptoms may be found gradual emaciation, a sustained temperature (moderately high), enlarged surface glands—pharyngeal, perivenal, prescapular; cough accompanied generally by an expectorate, which may be collected, prepared, stained, &c., and found to contain Koch's bacillus.

There are other various ways of confirming a diagnosis, viz.:—(1) Bacteriological examination of mammary secretion; (2) Harpooning (Bang's method); (3) Inoculation of guinea-pigs, &c., with the milk or other material from the affected organ; (4) Tuberculin test.

Tuberculin test is not reliable, as the animal may give a reaction,

and yet not be the subject of a tuberculous udder; the reaction might arise from some lesion in another part of the body; in the mediastinal or mesenteric lymphatic glands, for instance.

Affections of the udder likely to be confounded with a tuberculous one are:—(1) Chronic interstitial inflammation due to Streptococci; (2) Actinomycotic udder. In the first this commences at the lower end of the udder; the lymphatic glands are very much enlarged, but never nodular, and there is absence, as a rule, of general bodily symptoms. In actinomycosis the lymph glands are very slightly affected, microscopic examination does not show the tubercular organism, and there are usually numerous lesions in the skin covering the gland which discharges a material containing the ray fungus.

Way of Infection.—There are three methods by which it is possible for the udder to become infected:—(1) By the blood. (2) Lymph. (3) Teat canal. In practically every case the blood acts as the vehicle on the bacilli. Knowing as we do that the bacilli frequently gain access to the blood stream, it follows that they must be carried to the udder as well as to other parts of the body.

It is feasible to fancy that we might get a miliary form of disease in the udder if this were the case, but, as we know, this does not follow, but owing to the histological formation of the mammary gland the bacilli pass through with the milk, and this, as previously mentioned, goes on for some weeks before any physical change, to the naked eye, takes place. (2) Lymphatic infection. This is possible from backward lymphatic extension. (3) Teat canal.

It has been demonstrated by experiment that it is common for various organisms to gain access to the udder through the teat canal, causing the ordinary types of mastitis. Nocard first pointed out this fact. Therefore, if ordinary germs of mastitis can enter the udder by this channel, it is possible for tubercular bacilli to do the same.

Naked Eye Examination of Udder after Death.—The lymphatic glands are always affected, being very much increased in size, density, and frequently nodular. The cut surface may be either fibrous, caseous or gritty, according to the age of the inflammation.

On incision of the mammary gland the greatest appreciable change is its increased density and toughness to the knife. The cut surface reveals an enormously increased growth of the connective tissue between the lobules. The lobules themselves are not materially altered, but as it were being squeezed out of existence by the widened walls of connective tissue. The latter is of a dirty yellowish colour.

In some advanced cases, tubercles may be seen scattered about, their consistency depending on the age.

Yellow pultaceous-like material inhabits the bigger milk sinuses, which varies in its consistency.

The object of my committing these few disjointed notes to paper is to draw attention to the necessity of safeguarding the community against the ingestion of milk from diseased cows.

It rests with us, as members of the veterinary profession, to do our very utmost to press home the fact to all representative bodies, and also to the general public, of the absolute necessity of veterinary supervision of all dairy farms.

No other body of men has it placed in their power, and has the knowledge to make known the crying want of efficient control over the

source of the most widely-used and important article of food, food which is taken at the most critical period in the lives of the human race, in infancy and in time of sickness.

It must be carried out by men specially adapted in many ways; they must be scientifically trained, with a good deal of practical knowledge; and men who do not go in great fear of life and limb, for one is frequently informed that a cow is a kicker, but her udder must be palpated, and some milk drawn.

I have had practical experience of the untold good that follows examination of cows, even the knowledge that his cows are exposed to periodical visits from a veterinary surgeon acts on the farmer as a stimulant in his keeping his cattle healthy, well fed and clean.

A REVIEW OF RECENT INVESTIGATIONS AND OBSERVATIONS UPON THE IMMUNISATION OF ANIMALS AGAINST TUBERCULOSIS.

BY LEONARD PEARSON, V.S.

(*Abstract from the Second Annual Report of the Henry Phipps Institute.*)

EFFORTS to immunise animals against tuberculosis may be said to have commenced earnestly with the discovery of tuberculin by Koch in 1890.

This toxic substance produced by the tubercle bacillus *in vitro* was reported by Koch to have the effect of immunising experimental animals, of retarding the progress of tuberculosis, and, in some cases, it was thought to cure laboratory animals artificially infected. Koch observed that when a healthy guinea-pig is inoculated subcutaneously with a pure culture of tubercle bacilli the lips of the inoculation wound at first adhere, and the wound appears to heal. After from ten to fourteen days a hard nodule forms, which breaks and continues as an open ulcer until the death of the animal. But the condition is quite different when an already tuberculous guinea-pig is inoculated. In such an animal the wound unites at first, as before, but no nodule forms, and on the second or third day the seat of the inoculation is hard and dark, the skin becomes necrotic and sloughs off, leaving a flat, shallow ulceration which usually heals rapidly and permanently. Koch also found that dead tubercle bacilli rubbed up in water could be injected in large quantities into healthy guinea-pigs without injury other than suppuration at the point of injection, and that small quantities administered to infected guinea-pigs had the effect of prolonging the life of the animal so treated. It therefore appeared to be probable that tubercle bacilli contain some specific soluble substances capable of exerting a curative action. It was in an effort to discover this substance that tuberculin was made. Numerous experiments with tuberculin as a preventive and as a cure for tuberculosis of animals were made during several years following the discovery of this substance. It was at last established that while tuberculin had a specific effect upon the lesions of tuberculosis, and in some cases caused the lesion to become encapsuled, to recede, or to disappear, this effect is by no means constant, and is not sufficiently frequent to make this mode of treatment of practical value.

Experiments with tuberculin as a remedy for tuberculosis of cattle were made by the writer of this report in 1892, and were reported in the "Proceedings of the First International Veterinary Congress of America" in October, 1893. These experiments were made upon cows, and showed that the general effect of tuberculin on a tuberculous animal was to cause the disease to pursue a chronic course, or, in some cases, to become latent, but not to disappear.

The insufficient protection and the insufficient healing effect following the use of tuberculin led to efforts to discover other toxins that might give better results. Several modified tuberculins have been produced by Koch, E. Klebs, von Ruck, von Behring, Buchner, Hirschfelder, Maragliano, and others, but none of them have been sufficient to render an animal immune to tuberculosis permanently or to a practical degree.

Koch came to the conclusion that it was necessary, in the treatment of tuberculosis, to produce not only an immunity to toxins, but also a bacterial immunity, and felt that even in this disease he had seen evidence of an immunity of a degree sufficient to be of much value. He had observed, in acute miliary tuberculosis, when the bacilli are distributed throughout the entire body, a stage during which the bacilli, formerly so numerous, disappear to such an extent that they can be found only with difficulty. It appeared, therefore, that even in these cases there was a sort of bacterial immunity. In the earlier of this series of experiments Koch endeavoured to treat animals with entire bacilli, living or dead, introduced into the subcutis, the peritoneal cavity, or the circulation. But he found that he could not satisfactorily cause them to become absorbed, or that they produced disease or caused the death of the experimental animals. In addition to the original tuberculin the tuberculin A (T.A.), tuberculin R (T.R.), and tuberculin O (T.O.) were produced. It was found that T.R., extracted from crushed bodies of tubercle bacilli, produced the highest degree of immunity of any tuberculin. In fact he was able to satisfy himself that by repeated treatments with T.R. guinea-pigs could be protected against infection with virulent tubercle bacilli. Guinea-pigs that were infected before they were treated with T.R. showed some improvement. This work was repeated in part by Stroebe, who did not succeed in healing infected guinea-pigs, but he found that T.R. had the effect of influencing the disease and prolonging its course. Nor was he successful in immunising guinea-pigs against tubercle bacilli.

Arloing, Courmont, and Nicolas were equally unsuccessful in their investigations to test the action of T.R. upon animals infected experimentally. Spengler reported that he had found tuberculin to be capable of prolonging the life of infected guinea-pigs and to have a decided curative effect.

Injections of intact dead tubercle bacilli have been made by Koch and others with the same object in view. Such injections appear, in some instances, unquestionably to confer a certain amount of resistance to the attacks of virulent tubercle bacilli, but the resistance has not been found to be great enough to make this mode of protection of practical utility.

Antitoxins found in the blood of animals that have been treated with various toxins or tuberculins have been used to a large extent

experimentally for the purpose of immunising animals against, and treating animals infected with, tuberculosis. Maragliano was one of the first workers in this field. He obtained what he believed to be a curative serum by injecting toxins produced by, or extracted from, tubercle bacilli into experimental animals—dogs, asses, and horses. Living tubercle bacilli were not administered to the animals that were to produce the serum. It was shown that a serum produced in this way had the ability to neutralise the toxic effect of tuberculin.

In 1899 Maragliano reported, at the Tuberculosis Congress in Berlin, that by means of this serum he was able to immunise rabbits and guinea-pigs against ordinarily fatal doses of tubercle culture. He announced then that his tuberculosis antitoxic serum was produced through methodical and progressive injections of tuberculosis toxins. The antitoxin was tested by determining its value for protecting guinea-pigs and rabbits against a fatal dose of tuberculosis toxin. The antitoxin serum was found to exert its protective action when it was administered up to six hours before the poison, or when it was administered at the same time as the poison. The toxic substance here referred to, which killed guinea-pigs and rabbits in from two to three days when administered intraperitoneally, consisted of dead tubercle bacilli from which the fat had been extracted, or aqueous or glycerine extracts of tubercle bacilli or of the active principles obtained from these extracts. It was also found that if the antitoxins were administered with tuberculin to an infected animal, the occurrence of a febrile reaction, that without the antitoxin would surely occur, was prevented. He found the tuberculosis antitoxin to be quite harmless for man as well as for animals, and concluded that he was justified in claiming as a fact the production of a tuberculosis antitoxin that possessed the property of combating in the system the action of the tuberculosis toxin. He found that if guinea-pigs were inoculated intraperitoneally with virulent tubercle bacilli, and at the same time with antitoxic serum, fluid drawn from the peritoneal cavity twenty-four hours later contained bacilli, but that these were not virulent for other guinea-pigs. Guinea-pigs inoculated in this way—that is, with culture and antitoxin—were protected against acute intoxication, while control guinea-pigs receiving the same dose of culture died in two or three days. The guinea-pigs that had been inoculated with the culture and antitoxin together became emaciated and died within a month, but it was possible to save about 50 per cent. of them by continuing, intraperitoneally, injections of antitoxin. The excellent clinical results that are claimed for Maragliano's serum by numerous writers are not discussed here, as they do not come within the scope of this paper.

Niemann endeavoured to produce an antitoxic serum by treating animals with tuberculin and "mitigated" tubercle bacilli. He found that it was possible to produce artificial immunity against tuberculosis in dogs, cats, and guinea-pigs by repeated subcutaneous injections of tuberculin or of its active principles. The immunity so produced was proved by subcutaneous or intravenous inoculations with virulent tubercle bacilli. These inoculations failed to cause infection, as was shown by *post-mortem* examinations made some weeks or months later. He also found that it was possible to cause the development in the blood-serum of antituberculin either by treating the animal with

tuberculin or by injections of mitigated tubercle bacilli. The development of the antitoxin appeared to be influenced favourably by injections of dead tubercle bacilli.

McFarland produced "antituberculin" by treating an ass with increasing doses of tuberculin up to 150 cc. The serum from the blood of an ass so treated was used in experiments on guinea-pigs, and therapeutic trials were also made on tuberculous persons. The work on guinea-pigs comprised experiments to determine the effect of the serum on healthy animals, on animals already inoculated with tuberculosis, and to determine its immunising value and its ability to neutralise tuberculin or to counteract the effects of tuberculin administered to tuberculous guinea-pigs. It was shown that antituberculin was not injurious to healthy guinea-pigs, that it would not cure tuberculosis in guinea-pigs, and that it was not effective as an immunising agent. It did, however, as shown by one set of experiments, appear to have the effect of counteracting the effects of tuberculin on tuberculous guinea-pigs. This effect was not clearly shown in a second series of experiments.

De Schweinitz produced an antituberculosis serum by treating animals with the toxic products of tubercle bacilli. An extract from tubercle bacilli was made by shaking them for several hours in distilled water. His serum-producing animals were treated for several months.

von Behring, working in the same field, found that by the use of tuberculin toxins a specific antitoxin could be produced through the use of which the resistance of an animal to tuberculosis could be increased to a certain, but not to a large, extent.

The work that was done by all these investigators may be summed up by saying that it is well established that by the use of a tuberculosis toxin it is possible to immunise an animal against this toxin, and to produce increased resistance to tuberculosis already existing, or to which an animal may subsequently be exposed. But the immunising or curative results produced by toxins or by anti-toxin resulting from the use of toxins, while sufficient to be definite and measureable, were not proved to be sufficient to be of much practical value so far as the protection of animals against tuberculosis is concerned. Evidently the effect of their use was to produce a toxic but not a bacterial immunity. By means of these agents an animal may be shielded against the effects of the poisons of tuberculosis, and thus, to a certain extent, against the effects of the growth of tubercle bacilli. This appears to enable the resisting powers of the organism to come into play, and if the amount of infecting virus is not too great, or if the natural resisting power of the animal is large, it may be possible for sufficient immunity to result to protect the individual or for recovery to occur. It is, however, evident that immunity to be of much value must confer protection against the living organism as well as against its poisons. Progress in this line did not occur until efforts were made to immunise animals against living tubercle bacilli.

M'Fadyean (*Journal of Comparative Pathology and Therapeutics*, June, 1901, and March, 1902) has reported upon his experiments in relation to immunisation of cattle against tuberculosis. He inoculated four cattle intravenously with emulsions of tuberculous material and cultures from various sources. One of these cows, which had responded to the

tuberculin test and was, no doubt, tuberculous upon the beginning of the experiment, was given about 150 cc. of tuberculin in divided doses before inoculation. Fifteen weeks after inoculation with virulent tuberculous material this animal was killed and was found to contain but one tubercle, the size of a pea and completely calcified, in a mesenteric gland. Two control cattle, inoculated with an equal dose of the same material, were killed and both were extensively tuberculous.

Of the three other cattle of the series, one was tuberculous at the beginning of the experiment. All these were inoculated intravenously from seven to eleven times, during a period of from two to three years, with emulsions of tuberculous material and with cultures from various sources. It is interesting to note that the first inoculation upon each of the cows that was free from tuberculosis at the beginning of the experiment, was made with avian material, which, no doubt, was of very low virulence for cattle. The cattle so inoculated died of tuberculosis after from two to more than three years from the beginning of the experiment, and in each case the chief lesions were in the kidneys or in the brain or its covering membranes. The cerebral lesion appears to have been the immediate cause of death in each instance. There can be no doubt that these animals were remarkably resistant to tuberculosis, because they lived for some months and years after repeated inoculations with large quantities of material of proved virulence for cattle.

M'Fadyean concludes that: "It therefore appears to be justifiable to conclude that, whatever may have been the degree of natural immunity possessed by these three experimental cattle, it was much increased by the successive intravenous inoculations to which they were subjected. The immunity was not absolute, but it may be doubted whether a degree of resistance that will merit this term is obtainable by any method in cattle."

von Behring announced, December 12, 1901, that he was engaged in studying the immunisation of cattle against tuberculosis, and he has since issued several reports upon his work. von Behring has made a large number of experiments in this field. He has endeavoured to immunise animals against tuberculosis by the use of tuberculin, other tuberculosis toxins, by anti-toxins, by the use of dead tubercle bacilli, tubercle bacilli weakened by chemical agents, and by the use of living cultures of low virulence. Cattle treated by von Behring have been tested as to their resistance to tuberculosis by subcutaneous and intravenous inoculations with tuberculous material from cattle and with cultures of virulent tubercle bacilli of bovine type. Some of the animals immunised by von Behring have been tested as to their resistance by others. For this purpose cattle have been sent from Marburg to Lorenz in Darmstadt, to Schegel in Frieburg, and to Eber in Dresden. The treatment to which these animals were subjected and the extent of their immunity will be referred to later.

Pearson and Gilliland have published accounts of some experiments made by them upon the immunisation of cattle against tuberculosis by the use of cultures of tubercle bacilli of human type. They report upon a yearling bull brought under experiment November 19, 1900, when he was inoculated intraperitoneally with tubercle bacilli, obtained originally from human sputum. The same animal afterward received intravenous, subcutaneous, intraperitoneal, and intrapulmonal injec-

tions of tubercle bacilli of human type. In January, 1902, this bull was inoculated intraperitoneally with a suspension of a virulent culture of tubercle bacilli of bovine origin. The bull was kept eight months after this inoculation, and was fat and apparently healthy when killed. Lesions of tuberculosis were found, but these were neither extensive nor progressive. Three control cattle, inoculated with smaller quantities of tubercle bacilli from the same culture that was used for the inoculation of this bull in January, 1902, died with tuberculosis. It is evident, therefore, that a high degree of immunity to tuberculosis had been conferred upon this bull by the preliminary treatment with tubercle bacilli of human type.

The same authors report two other young cattle that received seven intravenous injections of from 10 to 25 cc. of standard suspension (0·013 to 0·032 gm.) of tubercle bacilli of human type during a period of ten weeks. Eight weeks after the last injection of tubercle bacilli of human type, the two vaccinated animals and also two unvaccinated controls were inoculated by injecting into the trachea 10 cc. of a suspension (0·013 gm.) of tubercle bacilli of bovine type, known to be virulent for cattle. These cattle were killed, ten weeks later, when it was found that the vaccinated animals were entirely free from tuberculosis, while the unvaccinated animals were very extensively infected.

The authors referred to conclude: (1) "That after repeated intravenous injections of cultures of tubercle bacilli from human sputum, the resistance of young cattle to virulent tubercle bacilli of bovine origin may be increased to such an extent that they are not injured by inoculation with quantities of such cultures that are capable of causing death or extensive infection of cattle not similarly protected. (2) That intravenous injections of much larger quantities of culture of human sputum tubercle bacilli than are necessary to confer a high degree of resistance, or immunity, upon the vaccinated animals, may be administered without danger to that animal."

Neufeld carried on, in Koch's Institute in Berlin, an extensive series of experiments upon the production of immunity by the use of living tubercle bacilli of low virulence. Neufeld ascertained by prolonged experimentation that it was not possible to obtain immunity in experimental animals by the use of toxins or dead tubercle bacilli. In his experiments he followed the plan of making preliminary injections of tuberculin or of dead tubercle bacilli, after which increasing doses of living cultures were used. He started with cultures of low virulence and of human type; following this he used cultures of bovine type. The experiments were made on goats, donkeys and cattle. He found that after making a number of intravenous injections of living cultures that a limit of tolerance was soon reached, and that this limit was due, not to the infecting action of the organism, but rather to its toxic effect. He holds that the extent to which an animal may be immunised is determined by the amount of toxin that it can endure or to which it may become accustomed. The toxic effect of the cultures administered was confined to the animals that had previously been treated with cultures. A fatal intoxication could occur within twenty-four hours after the administration of a suspension of tubercle bacilli. Such acute intoxication following the use of living tubercle bacilli occurred in all the species of animals used in these experiments. A few protocols are given in Neufeld's paper. These show that he was successful in

some instances in producing a high degree of immunity to tubercle bacilli of bovine type by a very short process.

Some of the animals immunised by Neufeld, as donkeys Nos. 3, 6 and 7, after having been treated with several intravenous injections of tubercle bacilli of human type, were proved to be exceedingly resistant to repeated large doses of tubercle bacilli of bovine type. The doses of bovine culture were in some instances four times as great as were required to kill an unprotected animal within two months.

Neufeld calls particular attention to the fact that it is possible to over-vaccinate, especially in goats, and thus to place the result of the immunisation in question. Too large doses of human tubercle bacilli (30 to 60 mg. given at several times) resulted in the production of a little, but not an effective, degree of immunity.

No protocols are given in relation to cattle, but it is stated that the experiments that have been made upon cattle have given in general the same results as those made upon donkeys and goats. Cattle were treated with different series of tubercle bacilli of human type and with tubercle bacilli of bovine type that had lost their virulence for cattle. It was customary to precede the injections of living organisms with injections of pulverized bacilli. These experiments show that it is possible to immunise goats, donkeys and cattle by intravenous injections of living tubercle bacilli of human type against fatal doses of virulent bacilli of human type. Neufeld's researches also show that it is not possible to obtain similar results with dead organisms.

Investigations by von Behring and his associates were referred to in chronological sequence, by reference to his first announcement in relation to the immunisation of cattle by the use of living cultures of tubercle bacilli of human type. His method has also been employed by other investigators, who have reported upon their work, so that the literature on this phase of the immunisation of cattle is becoming somewhat voluminous.

von Behring's first announcement of this subject was made at the Academy of Science of Stockholm, December 12, 1901, upon the occasion of conferring the Nobel prize. In this announcement the claim was made that a method had been found whereby it was possible to vaccinate cattle successfully against tuberculosis. The principles upon which such protection was based were briefly stated. The detailed report of von Behring's * early work in this field appeared during the following year, and has since been followed by several other reports. (*Loc. cit.*, Hefte No. 6, 7, 8, 9, 10).

von Behring's first report on the subject is made in association with Römer and Ruppel. Some of the later reports are issued by Römer. The first contains a description of the cultures of tubercle bacilli studied in von Behring's Institute, protocols showing the treatments that various animals received, and a general discussion of the subject of immunisation against tuberculosis. It is stated that the publication is made for the purpose of making it possible for the reader to form his own opinion as to the scientific foundation for the Marburg plan for combating tuberculosis of cattle. It was then planned, in co-operation with official veterinarians, to make practical tests on farms for the purpose of determining whether, by a simple and cheap

* *Beitrage zur Experimentellen Therapie*, Heft 5, Marburg, 1902.

method, it would be possible to protect cattle from infection. von Behring was led to hope that this would be possible, because he had observed that two or even one inoculation with tubercle bacilli of low virulence served to diminish the susceptibility of cattle to subsequent inoculations.

In Chapter II. of the report under consideration a number of protocols are given of animals repeatedly inoculated with tuberculosis virus and tuberculosis toxins of various kinds. The method pursued in the treatment of these cattle was not the same as that recommended for practical use. For such it was advised that one should first administer 0·001 gm. of tubercle bacilli of *human type* from a four to six weeks old culture of a special race designated as No. 1. Four weeks later the same animal was to be vaccinated a second time with similar material, but with twenty-five times the original quantity, namely, 0·025 gramme. Immunisation was recommended for cattle from five to seven months old that had been tested with tuberculin but did not react. It was considered that this system of vaccination was but provisional, and that it might be found to be advisable to precede the first vaccination by a vaccination with a less virulent organism or dead tubercle bacilli, or, on the other hand, that it might be found desirable to strengthen the second dose. These questions were to be solved by future investigations. *No experimental proof of the efficacy of the proposed system was furnished at the time it was advanced.*

The processs of vaccination against tuberculosis, as worked out by von Behring, was by him termed "Jennerization." A considerable part of von Behring's report is made up of a statement of facts in regard to the various cultures of tubercle bacilli that have been studied in his laboratory, and whose virulence for animals of various kinds has been tested. Attention is drawn to the fact that it was not until 1901 that a culture of tubercle bacilli was available at the Marburg laboratory that was distinctly virulent for cattle. Until 1901 the culture that was worked with chiefly was one obtained from human sputum in 1895.

This culture (No. 1) was fatal for guinea-pigs in seven or eight weeks when administered subcutaneously in a dose of 0·01 gramme. The same dose, similarly administered to a rabbit, caused but slight illness, but when administered intravenously caused death in from sixteen to eighteen days. Of this culture, 0·001 gramme administered intravenously to rabbits caused death in eight weeks. In cattle, 0·01 gramme intravenously produced a passing reaction or a moderate degree of illness, soon followed by recovery. This culture is not altogether harmless for cattle, for a large dose (0·05 gramme) administered intravenously causes grave illness. Even a dose of 0·01 gramme, intravenously, may cause a high fever, lasting almost three weeks. The virulence of this organism is less in old cultures and when it has been warmed and dried in a vacuum. These facts in relation to von Behring's culture No. 1 are furnished because this is the culture now used for his vaccinations.

The cattle that are especially reported on in this number (5) of the *Beitrage zur experimentellen Therapie*, are Nos. 8, 9, 10, 11, 16, 17 and 20. It is claimed that the protocols and temperature records that are furnished in relation to these cattle answer the two following questions: (1) Does this report furnish experimental proof that cattle

may, at will, be placed in such a condition of immunity to tuberculosis that they can withstand an inoculation with tuberculosis virus that is fatal for control animals? (2) Are tubercle bacilli from man under all conditions innocuous for cattle, and if so, is there an essential difference in these lesions from those produced by bovine tubercle bacilli? With a view of obtaining evidence leading to an answer to the first question reference is made to the protocol of *Cow No. 8*:—

1901

July. 4.—0·1 cc.tuberculin subcutaneously.
,, 12.—0·1 gm. attenuated tubercle bacilli intravenously.
Sept. 4.—0·001 gm. human tubercle bacilli intravenously.
,, 19.—0·1 cc. tuberculin subcutaneously.
,, 30.—0·2 cc. tuberculin subcutaneously.
Oct. 5.—0·01 gm. bovine tuberculous culture intravenously.
,, 14.—0·1 cc. tuberculin subcutaneously.
,, 16.—0·05 gm. tuberculin material intravenously from guinea-pig inoculated with bovine culture.
Nov. 15.—0·1 cc. tuberculin subcutaneously.
,, 17.—0·05 gm. culture human tubercle bacilli intravenously.
,, 28.—0·1 gm. human tubercle bacilli intravenously.
,, 30.—0·2 gm. human tubercle bacilli intravenously.
Dec. 2.—0·4 gm. human tubercle bacilli intravenously.
,, 9.—0·05 gm. caseous material intravenously.

1902

Jan. 8.—0·02 cc. tuberculin subcutaneously.
,, 16.—0·025 gm. bovine culture intravenously.

It is pointed out that on January 16, 1902, this cow was inoculated intravenously with 0·25 gramme of a serum culture of bovine tubercle bacilli twenty days old. The same inoculation was made upon treated cow No. 16 and upon control cow No. 43. No. 43 developed tuberculosis as a result of this inoculation, and died of miliary tuberculosis February 14, 1902, while the previously treated animals, Nos. 8 and 16, came through alive; indeed, No. 8 showed merely a fever of short duration and a little loss of weight, while No. 16 had a more severe fever, coughed, and presented the clinical signs of inflammation of the lungs. Cow No. 8 was killed in October, 1902, and is reported on very briefly by Römer. There were some nodules in the lungs which were well encapsuled. Whether tubercle bacilli were found in these nodules, and if so, whether they were living and virulent, is not stated.

A high degree of immunity is claimed for *Cow No. 11*.

1901.

Aug. *.—0·2 cc. tuberculin subcutaneously.
,, 21.—Tuberculous tissue from a cow subcutaneously.
Sept. 9.—0·001 gm. attenuated tubercle bacilli intravenously.
,, 16.—0·128 gm. iodoform intravenously.
,, 19.—0·1 cc. tuberculin subcutaneously.
Oct. 3.—0·2 cc. tuberculin subcutaneously.
Nov. 5.—5·0 cc. 2 per cent. iodid of potash subcutaneously.
,, 8.—0·1 gm. iodid of potash intravenously.
,, 10.—0·143 gm. iodoform.
,, 15.—0·2 cc. tuberculin intravenously.

* The date is not given in the Original.

Nov. 22.—0·005 gm. human tubercle bacilli intravenously.
„ 28.—0·01 gm. human tubercle bacilli intravenously.
„ 30.—0·0145 gm. dried bovine tubercle bacilli intravenously.

1902.

Jan. 8.—0·2 cc. tuberculin subcutaneously.
„ 13.—0·025 gm. human tubercle bacilli intravenously.
Feb. 17.—0·0001 gm. bovine tubercle bacilli intraocularly.

This animal was inoculated intraocularly February 17, 1902, with a dose and culture that always destroyed the eye of unvaccinated cattle. January 13, it was inoculated with a culture of human tubercle bacilli (No. 3), intensified by passage through a goat, so that it was more virulent than culture No. 1, and produced in a control (No. 40) a more severe reaction than in animal No. 11. However, it is not shown that this culture was capable of producing tuberculosis in a control. November 30, 1901, this cow was inoculated with bovine tubercle bacilli reduced in virulence by drying. No control experiment was made to show the effect of this same material when administered intravenously to an unvaccinated animal. This cow was killed in January, 1903, and was found to be free from tuberculosis. On the left lung there were connective tissue growths, but these were free from tubercle bacilli.

Animal No. 17 is also referred to as having a remarkable degree of resistance, as shown by the fact that when inoculated January 31, 1902, with 0.0025 gm. tubercle, it withstood the inoculation without loss of weight and with a fever of short duration, while a control animal (No. 45) similarly inoculated, died of miliary tuberculosis February 20. *Cow No.* 17:—

1901.

Sept. 20.—0·1 cc. tuberculin subcutaneously.
„ 20.—0·2 cc. tuberculin subcutaneously.
Oct. 11.—0·01 gm. dried tuberculous tissue from ox subcutaneously.
Nov. 22.—0·05 tuberculin subcutaneously.
„ 26.—0·0001 gm. human tubercle bacilli intravenously.
„ 28.—0·00025 gm. human tubercle bacilli intravenously.
Dec. 2.—0·0005 gm. human tubercle bacilli intravenously.
„ 11.—0·001 gm. human tubercle bacilli intravenously.
„ 19.—0·02 gm. human tubercle bacilli intravenously.
„ 21.—0·004 gm. human tubercle bacili intravenously.

1902.

Jan. 8.—0·2 cc. tuberculin subcutaneously.
„ 28.—0·2 cc. tuberculin subcutaneously.
„ 31.—0·0025 gm. bovine tubercle bacilli intravenously.

This cow was killed in August, 1902. Quite extensive lesions of tuberculosis were found, but a full statement as to the condition of this animal on *post-mortem* examination is, unfortunately, not given. It is stated that the lesions that were found in this cow were due to the inoculation of October 11, 1901, and not to the inoculation of October 31, 1902. It is, however, doubtful whether, from an examination of the lesions themselves, it is possible to show that this is the case.

(*To be continued.*)

Personal.

The County Council of London is to be congratulated on the selection of Messrs. W. Hunting, F.R.C.V.S., C. J. Humphrey, F.R.C.V.S., and W. F. Shaw, F.R.C.V.S., as Permanent Veterinary Inspectors under the Glanders and Diseases of Animals Act.

Mr. Hunting is, as might naturally be expected, the Chief Inspector, and in this position it is hoped that he will be given a sufficiently free hand to be able to officially deal with glanders in horses as he desires, and at last stamp the disease out of London and so out of England.

These gentlemen are, of necessity, compelled to give up private practice and to devote their whole energies to the work, and the profession may rest assured that at last glanders is on a fair way to eradication.

It is gratifying to learn that Mr. Hunting, although compelled to resign the Editorship of the *Veterinary Record*, a paper which he founded some nineteen years ago and has fostered through its struggling days and placed on a sure foundation, will still take a paternal interest in its progress, and has promised from time to time to enliven its pages with literary contributions.

The University of Dublin has thought fit to honour Captain E. J. D. Holmes, M.A., M.R.C.V.S., of the Indian Civil Veterinary Department, with the degree of Doctor of Science. Captain Holmes has done a great deal of bacteriological and research work amongst animal diseases in India, and is deservedly popular with his brother officers. His degree in Arts was obtained at Trinity College, Dublin, before he entered upon his professional career, and his veterinary studies were partly taken out at the Dick College and partly at the Royal Veterinary College in London, from whence he graduated in 1895.

Australia has the honour of being the first British Colony which possesses a duly qualified lady veterinary surgeon. At the final examination of the Victorian Veterinary Board held recently, Miss Bella Reid, a daughter of the late Senator Robert Reid, passed with distinction, obtaining second class honours. Miss Reid entered the profession through the Melbourne Veterinary College, fulfilling the prescribed course of three years' study, and passing in turn each of the necessary professional examinations.

Mr. Leslie Sheather, M.R.C.V.S., has been appointed Demonstrator in Pathology in the Royal Veterinary College, London, in the place of Mr. Collins, who recently accepted an appointment in Fiji. Mr. Sheather has had a very distinguished College career, and the appointment is one which will enable him to prosecute his scientific tastes to the fullest extent.

THE ROYAL SANITARY INSTITUTE.

At an examination for Inspectors of Meat and Other Foods, held in London on December 14 and 15, 1906, thirty-one candidates presented themselves. The following seventeen candidates were awarded certificates:—

Buckle, Herbert Stewart, Captain, A.S.C., Woolwich.
Cuckney, Alfred John, Brighton.
Draper, William Homer, Peckham.
Fisher, Henry Francis Thornhill, Major, A.S.C., Gosport.
Hill, Charles William, Carlisle.
Kelland, William Cottman, Beckenham.
Kett, Philip, Lowestoft.
Kett, Philip Frederick, Lowestoft.
Major, Richard, Brighton.
Peverett, George, Downs Park Road.
Pigott, Grenville Edmond, Major, A.S.C., Aldershot.
Rabbetts, Charles George, Merton.
Roberts, Herbert Keeling, Church Stretton.
Robinson, Ernest Sherwood, Wimbledon.
Scott, Philip Clement, Major, A.S.C., Dublin.
Smith, Richard, Parkstone.
Standen, Robert Hargrave Fraser, Major, A.S.C., Dover.

E. White Wallis, *Deputy Registrar.*

Reviews.

Surgical Diseases and Surgery of the Dog. By Cecil French, D.V.S. (McGill University). Published in Washington by Dr. Cecil French; in Great Britain by Henry Kimpton, London, and Alexander Stenhouse, Glasgow. 407 pp., 79 illustrations. Price 21s. net.

In this age of the motor car and diminution of the number of equine patients, the veterinary practitioners whose work lies in a large town have of necessity been compelled to pay more attention to canine work, and books confined solely to the ailments or surgical treatment of dog and cat patients are making their appearance with a fair amount of regularity and will always be welcomed.

Dr. Cecil French is well known in America for the original work he has contributed to veterinary literature on canine subjects, and the book which he has recently produced is in every way worthy of his authorship. Confining himself to surgical diseases, he has written descriptions of symptoms and treatment which are lucid, without padding, and straight to the point; and (a thing which is often unfortunately omitted) Dr. French has had the courtesy to acknowledge freely the work of other men in the same field by generous allusion or quotation. Commencing with a chapter on "General Surgery," the subjects of antisepsis, wound treatment, anæsthesia, septic infection, gangrene and the various methods of restraint are completely discussed. Following this we find a complete description of every conceivable useful operation (taken in detail, over the head, neck, and so on to each part of the body) which the expert canine surgeon may ever be called upon to perform.

Several of the ideas are quite new and originated in the brain of the author. The whole book is full of interesting facts, and to praise one part more than another seems invidious.

The illustrations (79 in number) are mostly original photographs and are clearly reproduced; the printers and binders have done their part in first-rate style, and we have nothing but praise for everything connected with the whole work. No practitioner who makes any attempt at canine work should be without it, as it is a book which should be kept close at hand for continual reference.

Translations and Extracts.

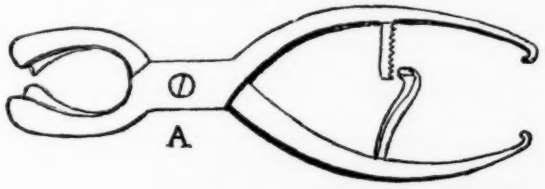
CASTRATION STANDING.

BY M. MARCEL, BALLON.

THE author points out the advantages of castration by the standing method to the busy country practitioner, not only on account of the rapidity with which it can be performed, but also its simplicity. He candidly states that it is not an ideal aseptic procedure, but points out that in the surroundings of the patient in an ordinary farm or country stable complete asepsis is impossible.

By the method he describes he has, during the past seven years, operated on over 1,300 horses and mules, of all ages and breeds, without an accident, or being obliged to throw a single one.

Instruments.—A strong twitch sufficiently long to prevent the man who holds it getting struck with the fore limbs, blinds such as are



used in coiling, and two ordinary hobbles joined by a strap about 6 to 8 inches long, fitted with a hobble to allow of it being shortened or lengthened as required, and a pair of forceps to tighten the clam, thin clipper somewhat in shape, with clams fastened by a string and a ring.

The forceps are made of steel about 6 inches in length and furnished with a toothed ratchet to keep them closed. The jaws of the instrument used with the clam fastened with string are straight; for those fastened with a metal ring they are bent at a right angle. They should be as light as possible consistent with strength. Those that the author has had in use many years were made for him by a country smith, and weigh about 4 ounces; he suggests that the weight might be diminished by using an alloy of aluminium.

Preparation of the Animal.—The animal is fastened by the head to a post, round which he can easily turn, or what is simpler and perhaps better, held by an assistant in a clear place where there are no

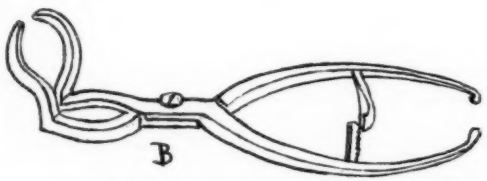
obstacles, so that there is nothing to obstruct the movements of the operator or his assistants.

The blinds and twitch are put on, and the hobbles *above* the hind fetlocks between them and the hock. This is important, as when put on in this manner the horse is enabled to move to a certain extent and prevent him throwing himself down during the course of the operation, and should he throw himself down he will be able to get up without any assistance.

An assistant holds the instruments and clamps, but at a pinch the operator can hold them himself. The scrotum, sheath and perineum are well washed with a disinfectant.

Operation. Left Side ; First Stage : Securing the Testicle.—The operator stands on the left side of the animal in front of the hind quarter with his back turned to the horse's head. The scrotum is grasped in both hands and the testicle drawn down as low as possible ; the cord is then grasped in the left hand, above the testicle, between the thumb and the fingers. The back of the hand is turned upwards and a slight degree of traction made on the cord.

Second Stage : Incision of the Scrotum.—The bistoury is grasped in the right hand, and by an incision made in one sweep and as rapidly as possible, the scrotum and dartos are divided, but not the deeper tissues. If the incision is large and deep enough, which can be told by the



marks that the scalpel will leave on the aponeurosis of the cremastor, a slight degree of pressure by the thumb and finger of the left hand will cause the testicle to come out of the opening.

The connective tissue is broken down with the thumb and finger of the right hand, and the testicle laid bare. The tissues of the scrotum are pushed up this cord as high as possible with the right hand, and then the left hand is removed and the naked cord grasped with it, the walls of the scrotum being kept up by it.

Third Stage : Adjustment of the Clams.—The clams are placed on the cord as high as possible, with the right hand from behind forward, the jaws being slightly compressed by the thumb and index of the left hand while the other fingers support it. The jaws of the forceps are then put on the clam, and pressed as tightly as possible with both hands ; the forceps being fixed by the ratchet and fastened by the string or ring which is slipped over the handle of the forceps. The author recommends the use of the ring as it is much more quickly adjusted than the string, which has to be tied.

Right Side.—Except that the operator stands on the right side, the manipulations are the same.

Some animals will stand absolutely still during the whole operation, but this is seldom. In any case, however, the movements made will not cause very much delay.

The first incision may cause such struggling and retraction that the testicle may slip out of the grasp. If the incision is not made large and deep enough there may be some little difficulty in continuing it in the same line ; hence the importance of making it in one sweep. This requires a little manual dexterity, but is easily acquired in a very short space of time.

In some rare instances the animal will drop down as soon as the clams are tightened, but there is no danger to be apprehended, and as they are kept tight by the ratchet they will not fall off.

Fidgety animals may attempt to lie down on the operator when the scrotum is handled, but if a side line is passed round the hind limb on the same side and drawn tightly by an assistant standing behind, it will leave the site of the operation clear for manipulation.

The author strongly recommends this process as it is quite easily performed, and permits of a large number of operations being performed in a short time, a matter of importance to the country practitioner.

Revue Générale de Médecine Vétérinaire.

STONE IN THE BLADDER IN THE DOG.

BY M. BALL.

PROFESSOR BALL publishes five cases of vesicular calculi in the dog, and makes some general observations on the subject that are of the greatest value.

Vesicular calculus is less frequent in the dog than the ox, and is more common in the horse than this latter animal. In the dog the calculi are generally multiple and fill up the whole bladder, and occasionally the smaller ones are passed into the urethra where they become fixed, or they may be formed in the urethra itself. In the bladder they generally occupy the neck, either loose or attached to the mucous membrane.

The author describes two sorts of lithiasis, viz., primary, due to nutritive troubles which cause changes in the saline constituents of the urine; and secondary, generally from microbic infection, the latter cause being the most frequent. Primary calculi are formed out of water and oxalates, secondary of phosphates, ammonia and magnesia. Hypertrophy of the prostate gland is an important factor in the formation of secondary calculi, as it gives rise to stagnation of the urine. A nucleus is necessary for their formation; this generally takes the shape of a mass of degenerated epithelial cells.

The presence of stone in the bladder may pass unnoticed for a long time, until some complication, such as retention of urine, hæmaturia, uræmic poisoning, or even, in extreme cases, rupture of the bladder from mechanical obstruction takes place.

M. Ball recommends as surgical treatment, laparotomy, cystotomy, lithotrity, and removal of the prostate gland. The line of medical treatment to be adopted is in uric lithiasis, a non-nitrogenous diet and alkalines, and in phosphates, benzoate of soda, salol, urotropine and biborate of soda.

(*Journal de Lyon*).

NECROSIS OF THE CONCHAL CARTILAGE OF THE EAR IN A MARE.

BY M. L. MAGNIN.

DURING the month of January, 1903, the patient, a mare, aged 6, was brought to the author's notice suffering from a small wound at the point of the right ear. The tip of the ear was covered with scales, and when these were removed a painful swelling the size of a nut was discovered, which was put down to a bite. The ear was cleansed and dressed, and the mare was sent back to her work.

FIG. 1.

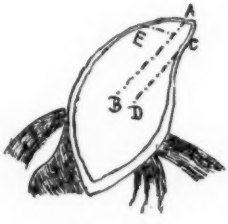


FIG. 2.

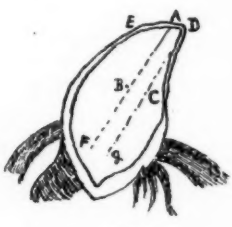


FIG. 3.

The tumour, however, continued to grow and became very painful, so much so that the bridle could only be put on with difficulty after a struggle. On February 5 the growth was as big as a hen's egg. The ear was covered with scales, and discharging a sero-purulent fluid, in which were a number of soft yellowish-green fragments of cartilage. A probe was passed into the wound at the point of the ear, and a fistula discovered running down the central axis for 5 to 6 centimetres in length, on the inner surface of the conchal cartilage between it and the skin. On February 7 the mare was thrown, and a seton passed at A B (fig. 1), and the part dressed with a disinfectant.

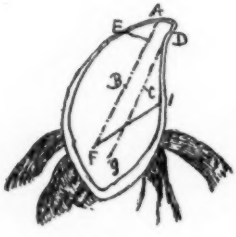


FIG. 4.

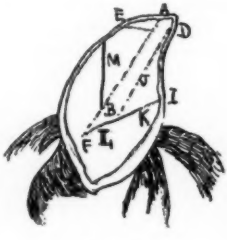


FIG. 5.

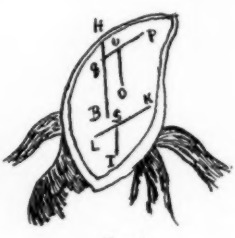


FIG. 6.

The suppuration gradually decreased, and the seton was removed on February 14, but on the 17th the mare had to be again operated on as two fresh fistulæ (C D and E A, fig. 2) were discovered. Two fresh setons were passed as shown in the dotted lines (fig. 2), and the part dressed as before. On March 3 the setons were again removed, but the inflammatory process continued to spread, both in extent and severity, and the animal would not allow the ear to be touched. On

March 8 she was operated on for the third time. The fistulæ were found to have extended as shown in B F and C G (fig. 3), the one A F being 10 to 11, and D G 7 to 8 centimetres in length. The three fistulæ were laid open and cauterised with a hot iron, and dressed with a disinfectant. This was most difficult to do on account of the mare's temper.

On March 17 a fresh fistula, 5 centimetres long (F I, fig. 4), was discovered, which were laid open and cauterised as before. On March 27 the patient had to be thrown and operated upon for the fifth time; a flap (K L, fig. 5) which interfered with the regular cicatrisation of the part being excised and cauterised. A small abscess had formed at M, which was opened, as well as a new fistula (B N), about 6 centimetres in length, which was cauterised.

On April 6 a sixth operation had to be performed, as another fistula about 1½ centimetres, with a small pocket, had formed (S R, fig. 6), which was opened and cauterised. The disease then stopped, the pain subsided, and the mare would allow her ear to be handled. She was sent back to work on April 24, at which date there was only a small wound at S, that easily healed up in about a fortnight.

The ear remained hard and curved forwards as if broken in two at its centre. Amputation was several times thought of, but not performed on account of the accompanying deformity. The thickening of the ear gradually disappeared.

(*Revue Générale de Médecine Vétérinaire.*)

FLOATING KIDNEY IN A COW.

BY REALI.

The patient, a cow, aged 8, began to lose condition, and showed a disinclination to stand. The respirations were slightly quickened, the respiratory movement being performed in three distinct motions. She frequently turned her head to the left side and licked her loins. On examination per rectum a movable tumour was found that corresponded to the left kidney. The urine was slightly albuminous.

The animal was slaughtered, and the left kidney was found to be displaced behind the right one. It was suspended by a sort of peduncle that allowed of its movements; in structure it was quite healthy.

(*Giornale della Reale Societa ed Accademia Veterinaria Italiana.*)

CYSTITIS IN AN OX.

BY REALI.

The animal, a working bullock, had been turned out on a wet cold night in swampy field. The next morning he was found to be so exhausted that he was taken on a cart to a stable, where he lay for four days. A veterinary surgeon was called in on the fifth day, and diagnosed a difficulty in urinating. On rectal examination the bladder was found to be greatly distended. The urethra and perineum were

fomented, and after a time urine was passed, but the animal shortly afterwards died.

On *post-mortem* examination the walls of the bladder were found to be lardaceous in consistency, and about three-quarters of an inch thick. The lining membrane was roughened and covered with fibrous patches; it was thickly coated over with a muco-purulent secretion. In places it had exfoliated, and there were two ulcers. The empty bladder weighed nearly 2 lbs.

(*Giornale della Reale Societa ed Accademia Veterinaria Italiana.*)

ŒSOPHAGEAL SPIROPTERA IN THE DOG IN SOUTHERN TUNIS.

BY LE MAITRE.

THE author states this disease is most fatal, and decimates imported dogs in the south of Tunis.

Almost all dogs in this locality are affected, and the symptoms are most varied. They may pass unnoticed, or they may be most marked. The case may be alarming but without danger, or, on the contrary, may be of the greatest gravity.

The chief symptoms are violent fits of coughing, followed by nausea and vomiting. In certain cases there was fever and progressive cachexia, vertigo, epileptic fits, and paralysis of the hind quarters. The cough and vomiting were caused by pressure on the pneumo-gastric and diaphragmatic nerves, by the tumour in the œsophagus, and the fever and emaciation by the absorption of the excretory products of the parasites.

The majority of cases appeared in the spring and summer, and the author advances the idea that the source of infection will be found either in water contaminated by certain insects, or through the medium of some unknown host.

On arriving at maturity the parasites leave the tumour, and are ejected either by the mouth or through the intestines, the tumour itself being absorbed, which process, however, is gradual and takes some months.

The critical period is that of invasion and development of the parasites in the tumour, depending on its shape, size and situation.

The ordinary anthelmintics, *i.e.*, turpentine, creasote, &c., are very uncertain, if not quite useless. The general symptoms indicate the administration of antipyrin, quinine, salicylic acid, salol, naphthol, bicarbonate of soda, cacodylate of soda, artificial serum and caffeine. The system should be supported with tonics, as quinine, cod liver oil, nux vomica, &c., and the nervous derangement with potassium bromide. Recovery is the rule if the patient survives the fifteenth day.

(*Recueil de Médecine Vétérinaire.*)

THE SURGICAL TREATMENT OF CHRONIC METRITIS IN THE BITCH.

BY M. BERGEON.

CHRONIC Metritis is very common in the bitch. It may be localised in the cervix (chronic cervitis) or it may involve the whole uterus (endometritis). This latter is the more frequent. It usually is preceded by acute metritis, which comes on from a variety of causes, such as frequent and difficult parturition, abortion, vaginal polypus, &c. Cervitis is characterised by a blood-stained discharge, and on examination with the help of the speculum, the mouth of the uterus will be seen to project more than is normal at the bottom of the vagina. It will also have on its surface a certain number of ulcers of variable size, but the lesions are altogether local.

In endometritis the discharge is greyish, muco-purulent and fœtid, and the patient becomes anæmic and eventually dies.

In cervitis the author recommends irrigation with permanganate of potash and cauterisation of the ulcers with iodine and glycerine; in endometritis he considers that hysterectomy is the only chance of a cure, medical treatment being useless. He describes the operation, and gives a number of cases, which in his hands have been successful.

(*Revue de Toulouse.*)

PURULENT TENO-SYNOVITIS IN A HORSE, WITH LAMINITIS SUPERVENING; LIGATURE OF THE DIGITAL ARTERY: *POST-MORTEM* EXAMINATION.

(*Communicated to the Antwerp Veterinary Medical Society, June* 17, 1906.)

BY M. VERLINDE, ANTWERP.

THE animal was accidentaly stabbed with a pitchfork about 6 inches above the fetlock in the hind leg, the wound penetrating deeply into the tendons. There was a blood-stained discharge of serum, inability to put any weight on the limb, and acute, sharp, shooting pain. It was impossible to ascertain the depth of the wound. The whole part was well irrigated with an antiseptic solution, and a dressing applied.

The next day the pain had increased and high fever had set in. The dressing was removed, and a compress with a warm solution of corrosive sublimate, 1 per 1,000, applied. The litter was heaped up behind under the sound limb to raise it up and avoid laminitis. A number of small abscesses formed round the injured part, which were opened. At first the patient remained standing, but afterwards lay down.

Six weeks later the animal could stand on the wounded limb, but the other one was affected with chronic laminitis.

M. Joly's operation of ligaturing the digital artery was performed, the wound healing in eight days. Another abscess formed on the wounded leg, which was opened.

The operation, however, proved to be unsuccessful, and the animal was destroyed two and a half months after the injury.

Post Mortem.—The examination was not made until some days had elapsed, and the limbs were decomposed. The tendons were adherent to the sesamoid pad, and just above it both they and the ligaments were united by a dark-coloured mass of connective tissue that looked as if it was infiltrated with pigment.

The ligature on the artery had been put on just above an important branch, and there was no clot either above or below it.

The results of the operation are curious, as there is a complete arrest of the growth of horn on the parts of the foot supplied by the obliterated artery, and furthermore, the internal lesions of the disease are most pronounced. Externally there is a round depression in the wall of the foot extending back to the heel, caused by the arrest of the growth of horn.

M. Bredo remarked that the cure of chronic laminitis was nearly hopeless; he had tried many plans, and had found median neurectomy to be the most successful. He mentioned a recent case of a ten-year-old pony that was unsuccessful. For the first fortnight the case did well, but then got so bad that it eventually had to be destroyed. What was noticeable was that there was hardly any deformity in the feet.

M. Verlinde replied that chronic laminitis was most intractable, and that he considered laminitis from standing was incurable.

ANÆSTHESIA IN THE DOG.

BY PROFESSOR SENDRAIL.

In cases where there is heart disease, as is the rule in ascites, chloroform is dangerous, and the author recommends the following hypodermic injection:—

Hydrobromate of scopolamine ...	10 milligrammes.
Hydrochlorate of morphine	10 centigrammes.
Distilled water	10 grammes.

The dose is 50 centigrammes per kilogramme of live weight, in very small dogs 1 gramme per kilogramme.

(*Revue Vétérinaire.*)

VARIOLA IN THE GOAT.

BY DRS. GABUTH AND REALI.

The authors give some observations on goat-pox, with their conclusions:—

(1) Small-pox in the goat is a different disease to that of the horse or cow-pox.

(2) It is much wider spread than is generally supposed; in certai parts it is enzöotic.

(3) The progress is usually benign, therefore it does not attract attention or cause alarm. Medical attendance is rarely called in.

(4) It is doubtful if it can be transmitted to man, although a benign form of the disease is seen in sheep.

(*La Clinica Veterinaria.*)

POST-PARTUM INFECTION IN THE BITCH.

BY DR. M. SAUTOUR, CONSTANTINOPLE.

THE author points out that amongst the sequelæ to parturition is one of puerperal infection that is not recognised, but which is of great practical importance, the intestines being the seat of infection, although he is not certain that the other organs may not be implicated. He finds that with rational and prompt treatment good results are obtained, and gives details of some cases.

CASE 1.—A five-year-old Newfoundland bitch. A week after pupping she became bad tempered, dull and depressed, bad appetite, great thirst, difficulty in moving, temperature normal; in fact, all the appearances of great fatigue. A tonic was prescribed.

The next day there was fœtid diarrhœa, temperature normal, refused food, and was very dull and listless.

On the third day the patient was completely prostrate, the diarrhœa continued, streaked with blood. She lay down with her head between her fore-paws, and took no notice of surrounding objects. There were fits of dry, hard coughing, and a muco-purulent discharge from the nose. She was weak and staggered when she walked.

When auscultated the lungs were normal, with the exception of slight râles and bronchitis. The eyes were sunk, dull, and wanting in expression, and she was greatly emaciated.

A laxative was prescribed, and 50 cc. of artificial serum injected, followed by 100 in the evening in two doses, at 6 and 8 o'clock. An expectorant was also given.

The animal was found dead at midnight, but the owner would not allow a *post mortem*.

CASE 2.—A three-year-old setter bitch had pupped twelve days before. Very depressed, bad appetite, great thirst, normal temperature. She refused to allow her pups to suck, and would not let them come near her. As in No. 1, nothing abnormal was seen on examination. A dose of castor oil was given.

The next morning the animal was much worse, fœtid diarrhœa, a stupid, dull look about the eyes, and difficulty in moving, the whole appearance being one of general infection. The following prescription was given :—

Orange flower water	...	...	...	100 grammes.
Tincture of cachou	...	...	...	5 ,,
Tincture of opium	...	...	...	1 gramme.

The next day she was somewhat better, the diarrhœa had lessened, but a cough set in. The following was given :—

Orange flower water	...	...	...	200 grammes.
Salicylate of bismuth	...	...	...	2 ,,
Salicylate of naphthol	...	...	...	2 ,,
Theobromine ...	...	...	...	4 ,,

As an internal antiseptic :—

Infusion of quinine	...	...	...	200 grammes,
Creosote	...	...	...	3 ,,
Kermes	...	...	...	2 ,,

to counteract the respiratory symptoms. In addition 100 grammes

of artificial serum were injected daily, and tonics prescribed. The animal completely recovered.

Dr. Sautour gives details of three other similar cases, and considers that this disease is *post-partum* invasion of the intestines, the first symptom of which is a fœtid blood-stained diarrhœa, which, if neglected, runs on into pneumonia. He hopes to publish some further observations on the subject, which, up to the present, appears to have escaped notice.

(*Bulletin Vétérinaire.*)

RECURRENT CASE OF MILK FEVER.

BY KAHN.

THE author relates two cases of recurrent milk fever, which he remarks is most uncommon. In one the cow had calved on April 12, and went down on the 15th. He saw her at 8 p.m., and treated her with insufflations of air at 2 a.m. On the 16th she got up, and was milked at 7 a.m. On the 16th and 17th she remained in good health, but on the 18th went down again at 10 a.m. with well-marked symptoms of milk fever. She was treated again by insufflations of air, and got up at 3 p.m., and remained in good health.

(*Tierartz Wochenschrift.*)

TWO CASES OF SPASM OF THE DIAPHRAGM IN THE HORSE FROM EXCITEMENT.

BY KLIMBERGER.

CASE 1.—The horse was an army one, and while on the march in rear of the column became very excited, trying to get on to the others, and sweating and fidgeting. The rider noticed violent palpitations, the heart thumping against his legs as he sat in the saddle. When seen by the author the pulse was 70, and the abdominal beats 20 to 22 per minute, the sound being heard six paces off. Cold water compresses with Prietnitz's apparatus, and two injections of morphia were given. The symptoms subsided at midday on the third day, but the animal was in a prostrate condition for four days afterwards. On enquiry it was discovered that the horse had suffered from a severe attack a year previous.

CASE 2.—In this case a tree was struck by lightning about fifteen yards away from where the horse was standing. In about ten minutes he showed signs of colic with spasms of the diaphragm, pulse 64, abdominal beats 26 to 28 per minute, the sound being audible two yards away. The same treatment was given, and the animal was relieved in about six hours, but the spasms did not disappear for twenty-four.

(*Zeitschrift für Veterinarkunde.*)

RUPTURE OF THE ANTERIOR TIBIAL MUSCLE.

BY LOTTERMOSER.

THE author describes six cases that came under his notice. The injury is characterised by great lameness, but the flexion of the femoro-tibial articulation is normal. There is excessive tension of the hock, and when carried forward the leg swings and seems weak; the tendo Achillis seemed numbed, and when the weight was put on the limb fell into folds. In two cases the accident was caused by jumping, the leg being caught up in the fence; three times by being caught up in a stump; and once in the front wheel of a carriage. In the first five cases the animals recovered in from three to four weeks, in the last the injury recurred a second time when galloped.

(*Zeitschrift für Veterinarkunde.*)

THE PROTECTIVE PROPERTIES OF BILE IN CATTLE PLAGUE.

BY ADANI.

THE author points out that it is well known that bile from an ox suffering from cattle plague will protect healthy animals, but how this is attained is a disputed point. Koch is of opinion that there is an active immunity given by the specific organism through the action of the bile. Nenki, Sieber and Wijnikewitch consider that this immunity is only passive and temporary. Adani explains the different results that have been reported by the fact that the bile contains both a virus and antitoxine, and the results of the inoculation depend on the preponderance of the one or the other.

Clinica Veterinaria.

FOREIGN BODY IN THE RECTUM OF A CAT.

BY ERAERS.

THE animal was said by its owner to have "a worm under its tail," which proved to be a piece of a fishing line about 5 cm. long. An attempt was made to withdraw it, but it had to be given up, as it was most painful.

The animal was placed under chloroform and a pair of forceps introduced into the rectum, the points of which came into contact with a metallic substance. This was divided with a pair of curved scissors, and the line with half a fish hook attached withdrawn. After several attempts the remaining half was also withdrawn by the forceps.

The owner of the cat hired out fishing boats on a river. There was no history as to when the hook was swallowed, or how long it took to pass as far as it did before it got stuck in the intestine.

(*l'Echo Vétérinaire.*)

HÆMOGLOBINURIA IN A MARE TWENTY-FIVE YEARS OLD.

BY M. ABERTR, V.S., SAINT RÈMY (BOUCHES-DU-RHONE).

THE animal, which was twenty-five years old, had been given complete rest for three days. On being taken out to the water trough she suddenly fell down and was unable to get up.

When called in, the author found she was suffering from hæmoglobinuria, with partial paralysis and slightly discoloured urine, which was passed by pressure on the bladder *per rectum*.

The treatment consisted in bleeding up to the quantity of six litres, with saline purgatives and diuretics, cold water enemata, and cold applications over the loins. The animal remained down for twelve days, but eventually recovered.

(*Journal de Lyon.*)

EPILEPSY FROM PARASITIC CYSTS IN THE BRAIN OF A DOG.

BY MM. REPIQUET AND SALVATORI.

THE subject was a Great Dane two years of age, that was suddenly attacked with epileptic fits which made the owner suspect either rabies or poison. An emetic was given, and a mass composed of bones and matted hair was vomited.

The paroxysms, however, continued, the animal falling on to the ground, the limbs being moved convulsively, with foaming at the mouth. In the intervals he moved in a clumsy fashion, and soon symptoms of hemiplegia on the right side set in. He got loose one day in the street, and was run over by a cab and killed.

On *post-mortem* examination a cyst was found in the anterior and upper lobe of the brain, and several others of smaller dimensions in the substance and on the lower surface. They all had the characteristic appearance of the cysts of the *Tænia cellulosis* of man.

(*Journal de Lyon.*)

CASE OF RENAL CALCULUS, WITH OBSTRUCTION OF BOTH URETERS, IN THE OX.

BY M. BARTHE, V.S., MAS GERNIER (TARN ET GARONNE).

THE animal, a five-year-old ox, was attacked with colic in the night. At 2 p.m. he was in an alarming condition, with severe colicky pains, loss of appetite, grinding of the teeth, and pinched and anxious expression of the face. Rectal examination showed that the bladder was empty, but according to the owner's account no urine had been passed for twenty-four hours.

The author thought there must be a rupture of the bladder caused by the urethra becoming obstructed by a calculus, and advised destruction. This was done, but on examination the bladder was found to be intact, and there was no trace of a calculus in the urethra. There was, however, a blood clot the size of a man's fist adhering

to the right kidney, both of which were hypertrophied, with a number of hæmorrhagic points on their surfaces. In the pelvis of both were a large number of irregular-shaped calculi, varying in size from a bean to a grain of wheat, one of which had no doubt blocked up the ureters.

(*Revue de Toulouse.*)

ENTANGLEMENT OF THE INTESTINE BY A PEDUNCULATED LIPOMA OF THE MESENTERY.

BY M. LASSERRE.

THE patient, a gelding, was attacked with colic during the night, and was found by his owner in the morning suffering from all the usual symptoms. He had passed a few pellets of fæces, but no urine. When seen the bladder was found to be full, and the urine was drawn off by catheter : he was then bled, and a subcutaneous injection of pilocarpine given.

The spasms of colic, although persistent, were not very severe, but in the evening the animal became very much worse, straining, making expulsive efforts, and sitting up like a dog. He died during the night, after having vomited a large quantity of food through the nostrils.

On *post-mortem* examination the stomach was found to be full of fermented food. The small intestine was greatly congested in the anterior portion, and at a short distance from the stomach there was a yellowish-red tumour, the size of a man's fist, that had entangled the intestine in its pedicle, which hung over it and was drawn tight by the weight. The tumour proved to be a lipoma with a pedicle about 4 cm. in length.

(*Revue de Toulouse.*)

DISTEMPER IN WOLF CUBS.

BY M. PARENT, V.S., JEVALLOIS PERRET, FRANCE.

THE author was called in by the owner of a menagerie to look at a litter of wolf cubs about 6 months old, of which five had died in three days, and the remaining six were very ill, with all the usual symptoms of canine distemper, viz., fever, muco-purulent discharge from the nostrils and eyes, quickened, painful and laboured respiration, vomiting, diarrhœa, and the characteristic pustules on the abdoman and inside the thighs. The diagnosis was confirmed on *post-mortem* examination. The author administered 30 grammes of castor oil and 2 grammes of salicylate of soda, with a mustard blister on the sides. The next morning there was no improvement, so he gave artificial serum injections. Eventually the six cubs recovered.

(*Revue de Toulouse.*)

NOTES ON A CLINICAL LECTURE ON TETANUS.

BY PROFESSOR CADIOT.

The following is a summary of a clinical lecture on the nature, etiology and treatment of tetanus given at Alfort by Professor Cadiot :—

TETANUS is caused from local infection by a specific microbe that is widely spread, especially on the surface of the ground. The organism develops, when protected from the air, in wounds. The disease is more common in hot than in cold climates, and experiments made by Vincent tend to show that high temperatures are favourable to the development of the disease.

The bacillus remains close to the point of inoculation, where it elaborates certain toxins that are diffused over the entire body; they act specially on the nerve centres, giving rise to the well-known symptoms of the disease. This assumes a variety of forms and degrees of severity, and is both acute and chronic: between these two forms there are a number of varieties.

A number of different methods of treatment, both surgical and medicinal, have been advocated, with more or less success, but acute tetanus is almost invariably fatal. The chronic form is amenable to treatment, and it is in it that recoveries have been seen; but independent of any particular drug or method of treatment.

Antitetanic serum does not destroy the toxin that has already gained access to the nerve centres, and therefore is not curative. It, however, assists by neutralising the toxins that are already in the circulation, but not localised, also those that are in process of elaboration at the point of inoculation.

In actual practice the line of treatment is to avoid anything likely to excite the medullary reflexes, to isolate the patient and keep him quiet, feed in the most convenient manner, disinfect the wound with antitetanic serum, and give sedatives and narcotics.

(*Revue d'Alfort.*)

TREATMENT OF CANKER AND THRUSH IN THE FOOT.

BY PROFESSOR LIENAUX.

CANKER is a chronic eczema of the horn, due to local vascular derangement, and characterised by congestion and œdema. This being the case, the author considers that the line of treatment should consist in applying pressure to the altered tissues, and such applications as will allow of absorption of the exuded fluids without interfering with the pressure and absorbent properties of the dressing.

He prefers the Danish plan, as the horse is able to work. The foot is pared, and the diseased horn and granulations removed; then the surface is dusted with salicylic acid, and a pad of tow applied that has been dampened and wrung dry, as dry tow will not properly adapt itself to the part. The pad is retained in position either by cross splints or a box shoe, and is changed every three or four days in moist,

and every eight days in dry, canker; but a cure will take about two or three months.

In order to get uniform pressure, M. Lienaux recommends that the pad be dressed with M. Delwart's mixture, viz., equal parts of Venice turpentine, black and white pitch. The pad thus impregnated moulds itself accurately to the shape of the foot.

The salicylic acid prevents the epidermis hardening, and the fluid is exuded and absorbed by the dressing, but chloride of lime or boracic acid can also be used.

(*Annales Belger.*)

PERIOD AT WHICH THE SALIVA BECOMES VIRULENT IN RABIES.

BY M. NICOLAS.

M. NICOLAS has made some researches into the important question as to how long before the appearance of the first symptoms of rabies the saliva becomes virulent, and arrives at the following conclusions.

In the goat the saliva becomes virulent at least six days before the appearance of the first symptoms, and in the rabbit forty-eight hours. In the dog this period varies from twenty-four hours to five days. In a first series of experiments M. Nicolas used intraocular inoculation, and in a second intramuscular, and found that the periods at which the saliva became virulent were: In the herbivora, twenty-four hours to three days in rabbits, a minimum of four and a half days, and in the dog thirty-six hours to four and a half days.

It therefore appears that the average time at which the saliva becomes virulent before the appearance of the first symptoms is six days, and that persons who have been bitten by rabid animals eight days before the appearance of the first symptoms should undergo the Pasteur treatment.

M. Nicolas' investigations are of great importance in the diagnosis of rabies in suspected animals that have bitten people, which should be kept under observation for at least six to eight days before an opinion is given.

(*Journal de Lyon.*)

RADIAL PARALYSIS IN A COW.

BY BACH (THOUNE).

ON September 26, 1904, the author was called to visit a cow that was excessively lame, the symptoms being most peculiar. She would move for a few steps almost sound, but the leg appeared to be too long, and the toes dragged along the ground; the leg would then be thrown violently forward, so that the weight was taken right on the heels. A minute examination of the leg failed to show anything. The author suspected shoulder lameness, and prescribed a liquid vesicant.

On October 11 there was no improvement. There was no swelling of either the shoulder or shoulder-joint, and the position standing was normal. When moving it was seen that the scapulo-humeral angle opened too wide, making the limb too long proportionately to the body; the point of the shoulder was thrown outwards, and the olecranon muscles were flaccid and soft. The greater part of the weight was thrown on the hind quarters, and the hind limbs were drawn under the body, and when she moved it was in the same manner as a horse with laminitis. The toes frequently caught in the ground, causing the animal to trip and tumble over, so much so that she was in danger of coming down. The skin, however, was sensitive. The cow fed well, retained her condition, and gave the usual quantity of milk. All the symptoms pointed to partial radial paralysis, which explained the inertness of the olecranon muscles.

Dr. Wyssmann, of Neuenegg, in the *Revue Générale de Médecine Vétérinaire*, vol. vi., 1905, p. 145, reports a similar case that recovered in two months. The author's case was not so satisfactory. There was marked atrophy of the olecranon muscles, the animal lying down and getting up with difficulty, but being able to walk better than at first, and not stumbling so often.

On December 20, being in good condition, she was sent to the butcher, but nothing wrong could be found with the radial nerve, and there was no trace of tuberculosis.

(*Schweizer Archiv. für Tierheilkunde.*)

Books and Periodicals, &c., Received.

Veterinary News; Surgical and Obstetrical Operations (M. L. Williams); Report of the Board of Agriculture; Department of Agriculture (Ireland); Tropical Agriculturist; Cape Colony Agricultural Journal; Transvaal Agricultural Journal; Journal of the Royal Army Medical Corps; Revue Vétérinaire.

Letters and Communications, &c.

Professor Craig; Professor Mettam; Mr. A. Hill; Colonel Nunn; Professor A. C. Duncan; Mr. R. L. Green; Messrs. Willows, Travess, and Butler; Mr. George C. Lowe; Mr. A. E. Payne; Mr. Thomas; Mr. H. Cribson; Mr. S. Black.

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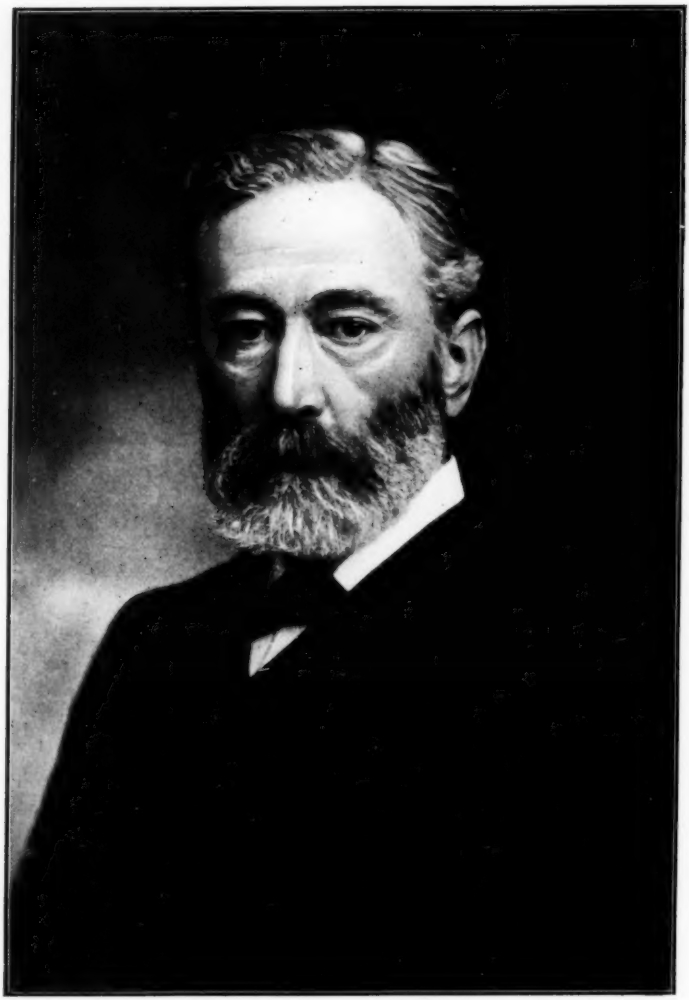

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